THE

JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

[REGISTERED AS A NEWSPAPER.]

VOL. XXIII. No. 559.] LONDON, JANUARY 27, 1874. [26TH YEAR.] Price 6d.

RAMSAY'S NEWCASTLE CANNEL COAL. Analysis—10,000 cubic feet of gas per ton of coal; 26-candle gas; 13½ cwt. coke per ton of coal.
The London Exhibition in 1851 was lighted with gas made from Ramsay's Cannel.
RAMSAY'S PATENT CONDENSED COKE.
DO. GARESFIELD COKE.

RAMSAY'S FIRE-CLAY ARTICLES. GAS-RETORTS, introduced 1828. FIRE-BRICK WORKS, established 1804. FIRE-CLAY SANITARY PIPES, CHIMNEY-TOPS, and all Goods made of Fire-Clay. The Fire-Clay is worked from Blaydon Main Colliery, is of excellent quality, and no expense spared in perfecting every article. The FIRE-BRICKS (marked "RAMSAY") are to be seen in all parts of the world, and the Works are the most extensive in the Kingdom.
Manufactories—Derwenthaugh, Swalwell, and Hebburn Quay, near Newcastle-on-Tyne; and London Wharves—Falcon Wharf, No. 80, Bankside; and Honduras Wharf, Cubit Town. Large stocks kept.
Address G. H. RAMSAY, NEWCASTLE-ON-TYNE.

GENUINE TORBAY PAINT.
(LATE CALLEY'S.)
WORKS: BRIXHAM TORBAY.
These Paints are now used in 100 Country Gas-Works, and by all (but one) of the London Gas Companies, on Gasholders, Scrubbers, Purifiers, &c.; also by the Admiralty, War Office, Railway Companies, Founders, &c.
They prevent and arrest rust, and protect iron from the action of water, sulphurous and gaseous exhalations.
The covering powers are considerably greater than those of any other oxide Paint; they will also cover tar.—*See "Engineer," Nov. 2, 1866.*
STEVENS AND CO.,
London Office,
21, GREAT WINCHESTER STREET, E.C.

TO GAS ENGINEERS AND IRONFOUNDERS.
THE Abergavenny Improvement Commissioners invite TENDERS for the supply and erection, at Abergavenny Gas-Works, of Three PURIFIERS, each 10 ft. square by 5 ft. deep, with centre-valves and connexions.
Full particulars may be obtained of Mr. Cross, the Manager, at the Gas-Works.
Tenders to be delivered to the Clerk to the Commissioners, at the Town Hall, Abergavenny, not later than Thursday, Feb. 5, 1874.
The Commissioners do not bind themselves to accept the lowest or any tender.
J. T. RUTHERFORD, Clerk,
Abergavenny Improvement Commissioners.
Jan. 24, 1874.

COWEN'S PATENT FIRE-CLAY RETORTS.
JOSEPH COWEN and CO.,
BLAYDON BURN, BLAYDON-ON-TYNE,
Were the only parties to whom a PRIZE MEDAL was awarded at the GREAT EXHIBITION of 1851, for "GAS-RETORTS and OTHER OBJECTS in FIRE-CLAY," and they were also awarded at the INTERNATIONAL EXHIBITION of 1862, the PRIZE MEDAL for "GAS-RETORTS, FIRE-BRICKS, &c., for EXCELLENCE of QUALITY."
J. C. and Co. have been for many years the most extensive Manufacturers of Fire-Clay Retorts and Fire-Bricks in the Kingdom. Orders for Fire-Clay Retorts of all shapes and dimensions, and to fit any shaped Mouthpiece, Fire-Bricks, and every other article in Fire-Clay, are promptly executed at their Works as above.
COWEN'S GARESFIELD COALS.
Coal Office,
QUAY SIDE, NEWCASTLE-ON-TYNE.
JOS. COWEN & Co. are the only Manufacturers of FIRE-BRICKS and CLAY RETORTS at BLAYDON BURN.

JOHN RUSSELL AND CO.,
THE OLD TUBE-WORKS, WEDNESBURY
AND
THE ALMA WORKS, WALSALL.
Established at the commencement of Gas Lighting.
WAREHOUSES:
69, UPPER THAMES STREET;
COMMERCIAL STREET, SPITALFIELDS;
5, CHARLES STREET, SOHO; and } LONDON
16, SOHO SQUARE,
35, 36, 37, & 39, GRANBY ROW, MANCHESTER.
J. R. and Co. are the original manufacturers of Wrought-Iron Gas Tubes and Fittings, and Inventors of the LAP-WELDED TUBES for Locomotive and Marine Boilers.
J. R. and Co. make all kinds of Tubes and Fittings for Gas, Steam, and Water; Gun-Metal Cocks, Stocks, and Dies; Galvanized Tubes and High-Pressure Tubes, &c.
Lists may be obtained on application to
69, UPPER THAMES STREET, LONDON.

JOHN BENT & SON,
BELL BARN ROAD, BIRMINGHAM,
MANUFACTURERS OF
WET AND DRY GAS-METERS,
OF
FIRST-CLASS MATERIALS & WORKMANSHIP;
Also, STATION-METERS, PRESSURE-GAUGES, STREET-LAMPS, REGULATORS, &c.
ESTABLISHED 1830.

THOMAS PIGGOTT & CO.,
SPRING HILL, BIRMINGHAM.
MANUFACTURERS OF
TELESCOPIC & SINGLE GASHOLDERS,
CAST & WROUGHT IRON TANKS FOR DITTO,
And Gas Apparatus of every Description.
Marine, Tubular, Cornish, Plain, Furnace, Saddle, and Range Boilers.
SUGAR, SALTPETRE, AND ALL KINDS OF PANS.
Roofs, Girders, and Bridges, and General Smith's Work.
LONDON AGENT—W. G. DAVIS, 2, Brabant Court, Philpot Lane, E.C.

SCOTTISH CANNEL COAL.
J. & W. ROMANS, Consulting Gas Engineers and Coal Factors, of Edinburgh and London, CONTRACT for supplying any quantity of COAL and CANNEL.
They are also Contractors for leasing Gas-Works, for supplying, erecting, or repairing gas apparatus and fire-clay goods.
Messrs. ROMANS, being lessees of several Gas-Works, have their Cannels tested in the ordinary working process, thus securing for their customers a guarantee beyond mere laboratory experiments.
Analysis, prices, and other information will be forwarded on application to their Offices, 8, Forth Street, EDINBURGH; 1, Walbrook, Mansion House, LONDON, or to the "Crown Wharf," Thomas Street, Limehouse, LONDON, where stocks of house, steam, and gas coal are always on hand.
Coal, machinery, fire goods, &c., shipped to all parts of the world.

THE
DUKE OF HAMILTON'S
LESMAHAGOW
CANNEL COAL.
AGENT:
JAMES M'KELVIE,
HAYMARKET,
EDINBURGH.

GEORGE GLOVER & CO.,
PATENTEES OF THE
NATIONAL STANDARD GASOMETERS
For the English Government, and for the Government of the Netherlands;
MAKERS OF THE DUPLICATE COPY
Presented by Her Majesty's Government to the French Government;
AND MANUFACTURERS OF
IMPROVED
DRY GAS-METERS,
Warranted to Measure correctly, and not to vary.
RANELAGH WORKS, RANELAGH ROAD, PIMLICO, LONDON, S.W.;
236, GEORGE STREET, GLASGOW; AND 15, MARKET STREET, MANCHESTER.
G. G. and Co. have just received the only Medal awarded for Gas-Meters at the Vienna International Exhibition.

SILVER MEDAL, PARIS EXHIBITION, 1867.

LLOYD AND LLOYD,

ALBION TUBE-WORKS, BIRMINGHAM,

MANUFACTURERS OF

WROUGHT-IRON TUBES AND FITTINGS

AND

LAP-WELDED IRON AND HOMOGENEOUS METAL BOILER TUBES.

Boiler-Tube Ferrules, Gun-Metal Gland Cocks, Water-Gauges, Whistles, &c.; Stocks, Taps, and Dies for Screwing, and Gas-Fitters Tools.

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LIVERPOOL: No. 63, Paradise Street. | PARIS: No. 38, Rue du Chateau d'Eau.

MANCHESTER: Barlow's Croft, Chapel Street, Salford. | LILLE: No. 38, Rue Grande Chaussee.

DANIEL HOWARD,

Successor to the late BENJAMIN WHITEHOUSE,

(ESTABLISHED IN 1765,)

BOILER AND GASHOLDER WORKS,

Westbromwich, near Birmingham.

MANUFACTURER OF TELESCOPE AND SINGLE GASHOLDERS,

WROUGHT & CAST IRON TANKS

FOR DITTO,

PURIFIERS, CONDENSERS, SCRUBBERS, HYDRAULIC MAINS,

And all kinds of GAS APPARATUS.

Wrought-Iron Roofs, Bridges, and Girders; Steam, Hot Water, and Range Boilers; Tanks, Cisterns, &c.,

And all kinds of Wrought-Iron Work.

DRAWINGS, SPECIFICATIONS, and ESTIMATES FURNISHED.

VICKARYS AND ROBERTSON,

Late JOHN VICKARY,

ESTABLISHED 1840,

GAS ENGINEERS, CONTRACTORS, IRON AND BRASS FOUNDERS,

WEST OF ENGLAND ENGINEERING WORKS, EXETER.

GASHOLDERS AND TANKS,

Retorts, Retort-Fittings, Condensers, Scrubbers, Purifiers, Station-Meters, Governors, Rack and Screw Valves. Gas and Water Mains always in Stock.

STEAM-ENGINES, EXHAUSTERS, SHAFTING AND GEARING, &c.

GAS-FITTINGS,

Including Chandeliers, Pendants, Hall Lamps, Brackets, Star and Sun Lights of all designs.

WET & DRY GAS-METERS,

Combining most recent improvements in principle and manufacture; upwards of 200,000 already in work, giving highest satisfaction.
(A guarantee of five years given with every Meter.)

PLUMBERS WORK, including Lift and Force Pumps; Cocks for Gas and Water and Steam; Brass Fittings.

HYDRAULIC AND GENERAL ENGINEERING

LONDON OFFICE: 8, JOHN STREET, ADELPHI, W.C.

TRADE MARK.

THE MEDAL FOR 1862.

The only Prize Medal awarded for TUBES & FITTINGS.

CROWN TUBE-WORKS,

WEDNESBURY, STAFFORDSHIRE.

WAREHOUSE: SOUTHWARK STREET, LONDON.

JAMES RUSSELL & SONS, LIMITED,

PATENTEES & FIRST MAKERS OF WROUGHT-IRON TUBES,

ONLY MAKERS OF HOMOGENEOUS METAL TUBES.

MANUFACTURERS OF

TUBES and FITTINGS for GAS, STEAM, and WATER;

LAP-WELDED, LOCOMOTIVE, MARINE, and other BOILER TUBES;

HYDRAULIC TUBES, BEDSTEAD TUBES, WELL TUBES, TELEGRAPH POSTS, COILS, &c.;

GAS-FITTERS TOOLS, VALVES, COCKS, &c.

THOMAS PIGGOTT & CO.,

(Established 1822,)

SPRING HILL, BIRMINGHAM.

MANUFACTURERS OF

TELESCOPIC & SINGLE GASHOLDERS,

CAST & WROUGHT IRON TANKS FOR DITTO;

PURIFIERS, CONDENSERS, SCRUBBERS, RETORTS, VALVES;

IMPROVED WROUGHT-IRON RETORT-LIDS, CROSS-BARS, & SCREWS;

AND GAS APPARATUS OF EVERY DESCRIPTION.

SOLE MANUFACTURERS OF LIVESEY'S PATENT GASHOLDER MAN-LID,

By use of which Man-lid, inlet and outlet pipes can be examined and cleansed without loss of gas in crown of holder, or ingress of atmospheric air.

ROOFS, GIRDERS, BRIDGES, AND BOILERS OF ALL KINDS.

Drawings, Specifications, and Estimates supplied on application.

London Agent: W. G. DAVIS, 2, BRABANT COURT, PHILPOT LANE, E.C.

HENRY HOWARD & CO.,

COOMBS WOOD PATENT TUBE-WORKS.

OLD HILL, near DUDLEY,

MANUFACTURERS OF

HOWARD'S PATENT IMPROVED WROUGHT-IRON TUBES,

FOR GAS, STEAM, AND WATER;

Also ORDINARY WELDED WROUGHT-IRON TUBES and FITTINGS,

FOR GAS, STEAM, & WATER, EITHER BLACK, GALVANIZED, OR ENAMELLED.

CORE BARS FOR IRONFOUNDERS, STOCKS, TAPS, AND DIES, IRON COCKS, &c.

London Agent—W. G. DAVIS, 2, Brabant Court, Philpot Lane, E.C.

LIME SUPERSEDED

IN THE

PURIFICATION OF ILLUMINATING GAS,

BY

Spence's Patent Dry Copperas,

The only Purifying Material which removes, by one process, all Ammonia and Sulphuretted Hydrogen. It has been in use for upwards of four years at some of the largest Gas-Works in the Kingdom.

TESTIMONIALS SENT ON APPLICATION.

SPENCE BROTHERS CHEMICAL COMPANY, LIMITED,

VICTORIA CHEMICAL WORKS, ASHTON NEW ROAD, BRADFORD, MANCHESTER,

Manufacturers of SPENCE'S PATENT DRY COPPERAS; GREEN COPPERAS;

SPENCE'S PATENT GAS DEODORIZER;

SULPHATE OF AMMONIA, GREY AND BROWN; SULPHURIC ACID; MUDIE'S DISINFECTANT, &c.

CONTRACTORS FOR THE PURCHASE OF SPENT OXIDE.

ALL COMMUNICATIONS TO BE ADDRESSED TO THE WORKS.

Established

1795.

JOSEPH CLIFF & SON,

THE ORIGINAL

WORTLEY FIRE-BRICK WORKS,

NEAR LEEDS,

MANUFACTURERS OF ALL DESCRIPTIONS OF

FIRE GOODS, and Salt-Glazed Drain-Pipes.

LONDON WHARF:

Wharf No. 4, inside Great Northern Goods Station, King's Cross, N.;

LIVERPOOL—1, Back Leeds Street,

Where is always kept a Stock of Retorts, Fire-Bricks, Terra Cotta Ware, and Drain-Pipes.

THE IMPERIAL METER COMPANY, LIMITED,

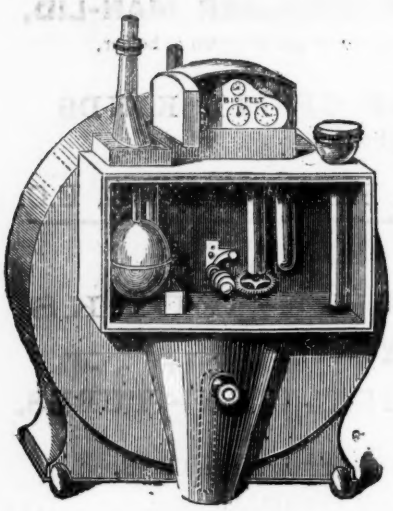
MANUFACTURERS OF

WET AND DRY GAS-METERS,

PRESSURE-GAUGES AND GOVERNORS, AND STREET-LAMP REGULATORS.

FACTORIES:

KING'S ROAD, LONDON, N.W., and GRAY'S INN ROAD, LONDON, W.C.



Front View.

THE

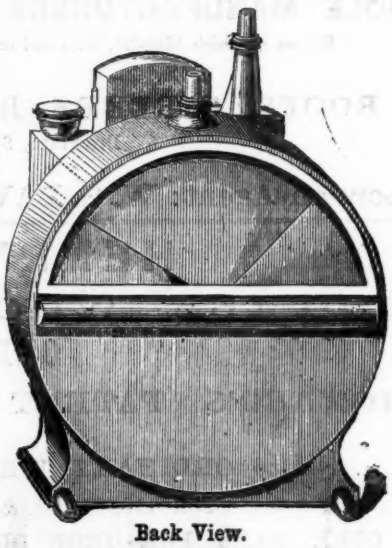
IMPERIAL

COMPENSATING

WET GAS-METER.

DE CASTRO & BURTON'S

PATENT.



Back View.

I. **This Meter is more simple in construction than the common non-compensating Meter.**
II. **An unvarying water-line is maintained.**
III. **No amount or kind of pressure will cause it to "flood."**
IV. **It is practically unaffected by "tilting."**
V. **The friction is less than in any other Meter; and**
VI. **It will last for twelve months without requiring to be refilled.**

THE IMPERIAL METER COMPANY, LIMITED, ALSO MANUFACTURE COMMON NON-COMPENSATING WET GAS-METERS OF ALL SIZES, BOTH IN TIN AND CAST-IRON CASES.

SPECIAL ATTENTION

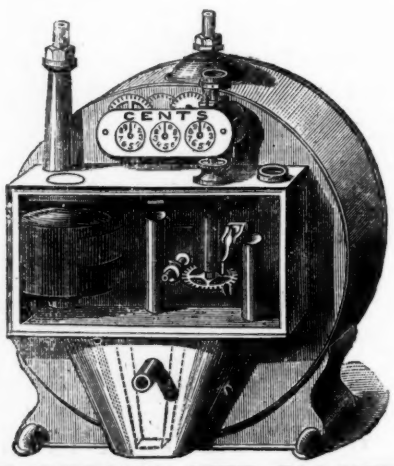
IS PAID TO THE

MANUFACTURE OF

STREET-LAMPS

AND

REGULATORS.



THE IMPERIAL WET GAS-METER.
Non-Compensator.

STATION-METERS

WITH PLANED JOINTS,

AND

GOVERNORS,

MADE TO ORDER

Mr. GEORGE MACKANESS will represent this Company in the Provinces.

OFFICES: 41, FLEET STREET, LONDON, E.C.

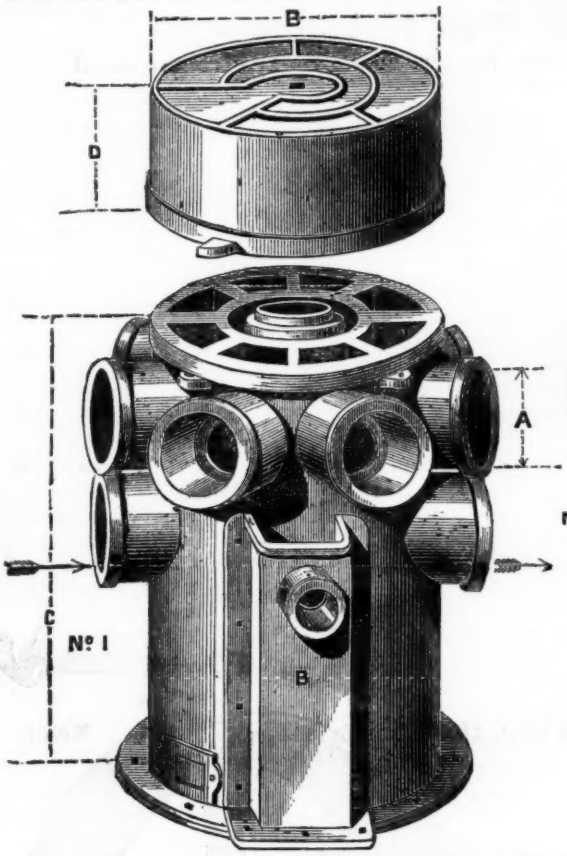
W. MOORE, Secretary.

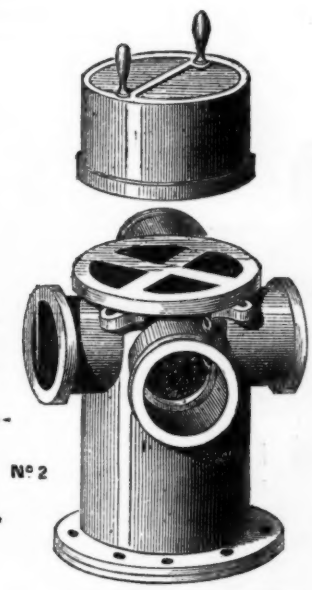
☞ *All Communications to be addressed to the Secretary.*

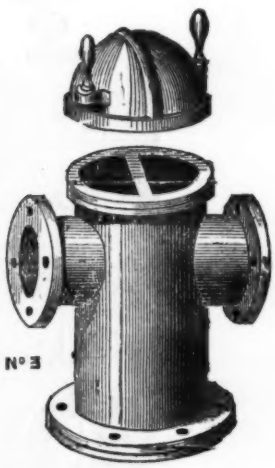
MESSRS. NEWTON, CHAMBERS, & CO.,

THORNCLIFFE IRON-WORKS, NEAR SHEFFIELD.

IMPROVED CENTRE-VALVES.







THORNCLIFFE IMPROVED BYE-PASS VALVE. SIZES FROM 3 INS. UPWARDS.

THORNCLIFFE IMPROVED STOP-VALVE. SIZES FROM 3 INS. UPWARDS.

Sizes of the THORNCLIFFE IMPROVED CENTRE-VALVE.

	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.
A. Bore of Pipe. . .	4 ..	5 ..	6 ..	7 ..	8 ..	9 ..	10 ..	12
B. Diameter of Body.	16 ..	20 ..	23 ..	26 ..	28 ..	31 ..	34 ..	40
C. Height of Tank .	33 ..	35 ..	38 ..	43 ..	46 ..	48 ..	51 ..	56
D. Depth of Cover .	8 ..	9 ..	10 ..	11 ..	12 ..	13 ..	14 ..	16
Total Height . .	44 ..	44 ..	48 ..	54 ..	58 ..	61 ..	65 ..	72

In all cases the Covers are cast heavy enough to resist any required pressure.

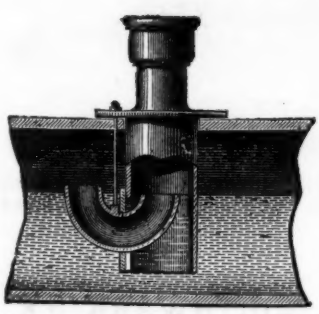
The advantages derived from the adoption of these Valves are so manifest and cardinal that in the immediate character of the change—the simplicity of the machine—the facility affording for cleaning out connexions between Valve and Purifier—the perfect collection and delivery by suitable overflow of the ammonia, at a greatly diminished depth from ground-line over the old form of Valve—the advantage of connecting on the same level, and at any angle, or opposite to each other, the inlet and outlet pipes without dip or rise—the clear acquisition of space in the purifying-house, by being able to place the boxes nearer together, the new Valve being entirely under the floor—and lastly, though of the greatest importance, the passage of crude and unpurified gas during the change is minimized to the merest fraction, thus preventing the fouling by impure gas the delicate machinery and easily affected exposed movements of the station-meter, thereby preventing the introduction of the enemy (unpurified gas) into the gasholder. Also a dead abutment is offered to all back pressure, imparting thereby to the gauges, governors, and hydraulic seals, a steadiness of action never realized with the once famous, but now fast becoming obsolete, Hydraulic Centre-Valve.

N., C., and Co. also Manufacture and Erect

PURIFIERS, CONDENSERS, SCRUBBERS, GASHOLDERS, ROOFS,

And every description of Gas Machinery.

TENDERS GIVEN FOR WORK FIXED COMPLETE IN ANY PART OF THE KINGDOM.



Messrs. N. C. & Co. are also the Sole Agents for

HAWKINS' PATENT SELF-ACTING DIP-PIPES.

These Patent Self-Acting Dip-Pipes are rapidly coming into general use by gas companies. By their use the whole of the pressure caused by the old kind of Dip-Pipes is entirely removed, therefore the yield of gas per ton of coal is considerably increased. They also act as a perfect safeguard against the deposit of carbon (or scurf) inside the retorts.

A saving of fuel is effected, and the wear and tear to the retorts greatly diminished.

They are also perfectly Self-Acting, they being regulated solely by the gas. They cannot get out of repair, and when once fixed, will last as long as the old kind, and can be easily adjusted should the hydraulic main sink; they can also be worked with advantage where there is no exhauster.

Testimonials can be had from Herbert Unwin, Esq., engineer of the Sheffield United Gaslight Company and the Penistone Gas Company. At both these companies works they have been in constant operation for several months. Further testimonials can be had on application to the Patentee, J. G. Hawkins, Effingham Street Gas-Works, Sheffield.

For Prices, &c., apply to

Messrs. NEWTON, CHAMBERS, & CO.,

THORNCLIFFE IRON-WORKS, near SHEFFIELD.

GEORGE WALLER & CO.,

GAS ENGINEERS AND CONTRACTORS,

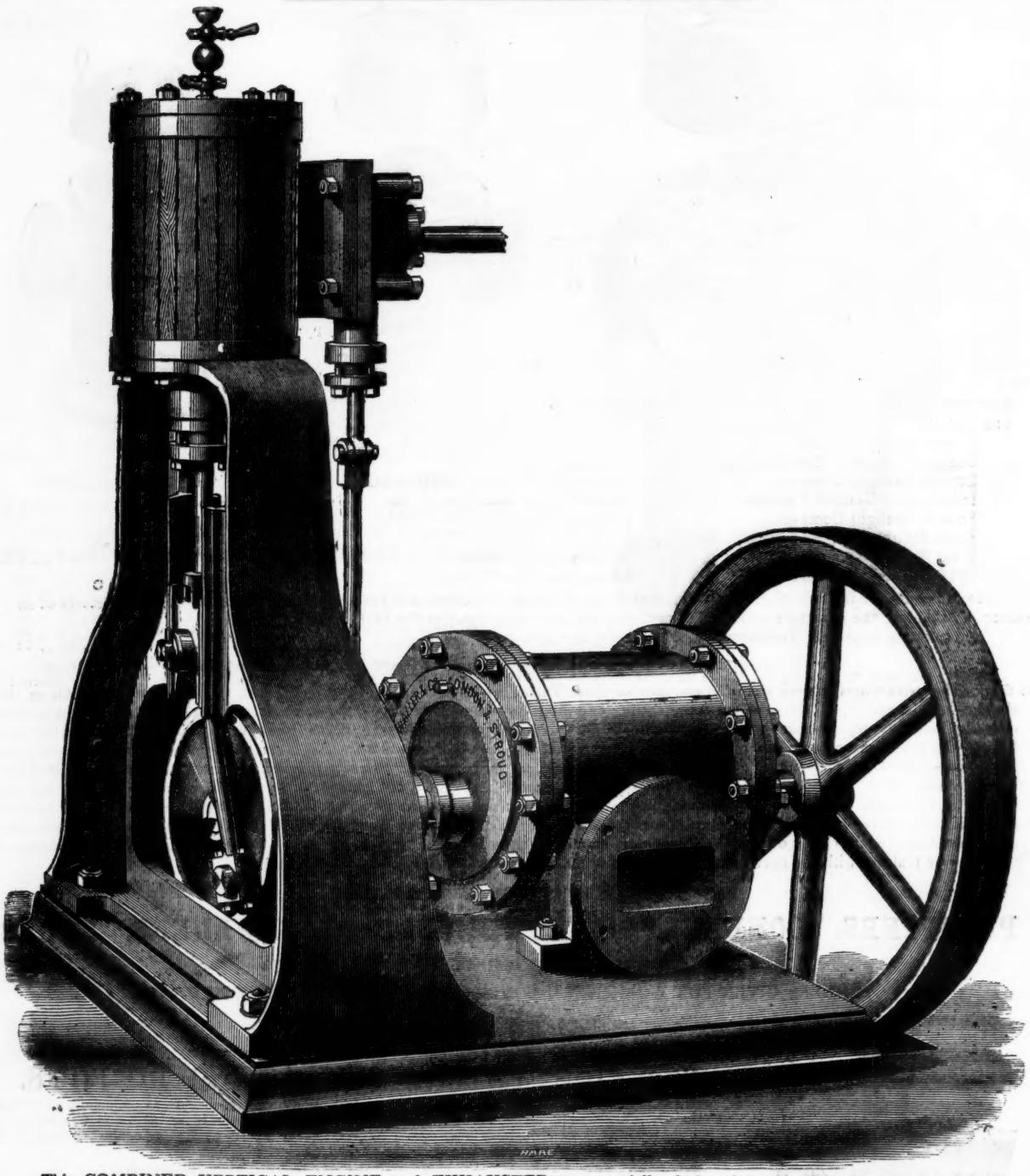
SOLE MAKERS OF

Beale's Improved

PATENT GAS-EXHAUSTERS AND COMBINED ENGINES,

ON ONE BASE PLATE.

NOTE.—The Exhausters are extra large for moderate speed.



This COMBINED VERTICAL ENGINE and EXHAUSTER was specially designed by G. WALLER AND Co. for small works, where space is an object, and is applicable for Exhausters from 1000 to 15,000 per hour. This is the *only* Engine and Exhauster **complete on one Base Plate,** requiring only one foundation.

NOTE.—They are sent away complete, and are easily fixed.

PHŒNIX ENGINEERING WORKS, HOLLAND STREET, SOUTHWARK, S.E.,

AND AT

STROUD, GLOUCESTERSHIRE.

TANGYE BROTHERS AND HOLMAN,

LAURENCE POUNTNEY LANE, LONDON, E.C.,

SOLE MAKERS OF

MORTON'S PATENT SELF-SEALING RETORT-LIDS,

WITH

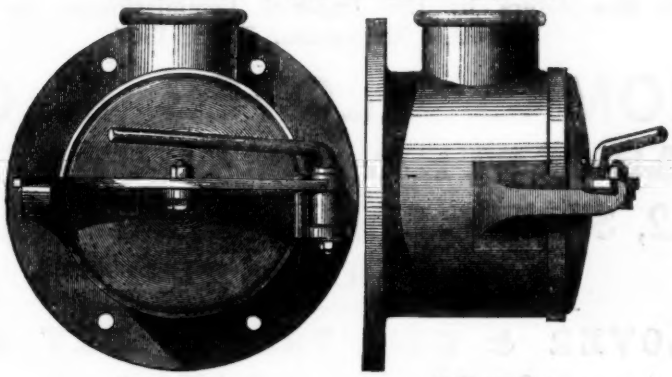
HOLMAN'S PATENT ECCENTRIC FASTENINGS.

OVER 7000 IN USE.

NO LUTING.

LIDS HINGED TO MOUTHPIECES; NO LIFTING ON OR OFF.

NO SCREWS FOR FASTENING.



FRONT VIEW. SIDE VIEW.

SIMPLE.

ECONOMICAL

DURABLE

EFFECTIVE.

NO DUPLICATE LIDS REQUIRED.

These Lids are proved by many eminent Gas Engineers to be the most efficient, saving much time, labour, and expense; are opened and closed as quickly and with as little trouble as an ordinary furnace door, and by their use the Retorts are soundly sealed during the whole period of carbonization.

THESE LIDS ARE ADOPTED BY THE FOLLOWING (AMONG MANY OTHER) GAS COMPANIES:—

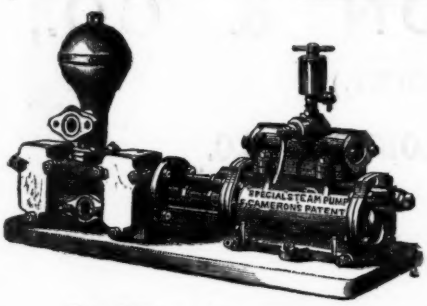
The Gaslight Company, Beckton (where over 2000 are in use).	The Gas-Works, Royal Arsenal, Woolwich.	The Nottingham Gas-Works.
,, Gaslight Company, Bow Common.	,, Alliance and Dublin Gas-Works.	,, Newcastle-on-Tyne Gas-Works.
,, London Gaslight Company.	,, Edinburgh Gas-Works.	,, Carmarthen Gas-Works.
,, Independent Gaslight Company.	,, Manchester Corporation Gas-Works.	,, Merthyr Tydfil Gas-Works.
,, Phœnix Gaslight Company.	,, Salford Corporation Gas-Works.	,, Ystrad Gas-Works.
,, South Metropolitan Gaslight Company.	,, Rochdale Corporation Gas-Works.	,, St. Alban's Gas-Works.
,, West Ham Gas Company.	,, Liverpool United Gas-Works.	,, Over Darwen Gas-Works.
,, Imperial Gaslight Company.	,, Birkenhead Gas-Works.	,, Aylesbury Gas-Works.
	,, Birmingham Gas-Works.	,, Cardiff Gas-Works.

The Morton's Lid is made circular in form, that being the most convenient and suitable shape. It can be used for Retorts of an section, by adapting the Mouthpiece casting from the D, oval, or other shape, at the back, to circular in front.

The following important Testimonial, among others, has been given:—

The Gaslight and Coke Company. Engineer's Office, 6, Westminster Chambers, Nov. 14, 1871.

Dear Sir,—In reply to your inquiry, I have the pleasure of stating that the whole of the Mouthpieces at Beckton have Morton's Lids attached to them, and they have given us every satisfaction. We have 2160 in use.—I remain, yours truly, (Signed) F. J. EVANS.



THE HIGHEST PRIZE AND

ONLY "MEDAL FOR PROGRESS"

For Direct-Acting Steam Pumps for General Purposes,

WAS AWARDED BY

THE INTERNATIONAL JURY AT VIENNA, 1873,

TO

TANGYE BROTHERS & HOLMAN,

FOR THE

"SPECIAL" STEAM PUMP.

In Use in over Seventy Gas-Works in the United Kingdom,

FOR PUMPING EITHER WATER, AMMONIACAL LIQUOR, OR TAR.

PRICES OF THE LEADING SIZES OF "SPECIAL" STEAM PUMPS ADOPTED IN GAS-WORKS.

Diam. of Steam Cylinder... In.	3	4	4	6	6	8	6	7	7	8	10	8	10	8	12
Diam. of Water Cylinder... ,,	1½	2	3	3	4	4	5	5	6	6	6	7	7	8	8
Length of Stroke ..... ,,	9	9	12	12	12	12	12	12	12	12	12	12	12	18	18
Diam. of Suction & Delivery ,,	1	1¼	2	2	3	3	3½	3½	4	4	4	5	5	6	6
Gallons per Hour, approximate.	680	815	1830	1830	3250	3250	5070	5070	7330	7330	7330	9750	9750	13,000	13,000
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THE JOURNAL OF GAS LIGHTING,
WATER SUPPLY, & SANITARY IMPROVEMENT.

TUESDAY, JANUARY 27, 1874.

Circular to Gas Companies.

WHEN the new Parliament meets, it is likely that serious attempts will be made to obtain some alteration in the Municipal Corporations (Borough Funds) Act. The mayor of Birmingham, who is conspicuous in the agitation for the alteration, is likely to obtain a seat for Sheffield, and will be able to support in the House of Commons the proposal he makes at Birmingham. It is very unlikely that, in the first session, any Government, of whichever party it may consist, will find time to deal with the measure, and no private member need trouble himself with the attempt. None the less it behoves all concerned to be prepared to oppose any alteration in the Act in question. Nothing can be sounder in principle, nothing more in accordance with the true spirit of municipal institutions than that the ratepayers should be consulted before large pecuniary liabilities are incurred by a Corporation. It may hamper and embarrass a Town Council, as all checks and restraints do; but if the views of the ratepayers and the council are in accordance, the result of a plebiscite strengthens the hands of the council. As regards the proviso to section 2, which Mr. Chamberlain is also anxious to get rid of, we look on that as essential to the existence of statutory companies in boroughs, and it must be fought for with all the vigour we can command.

A curious point of some interest to companies who may be compelled to increase the price of gas was raised in the Westminster County Court the other day. The Chartered Company were sued by a consumer for 10s. 3d. paid under protest, the plaintiff contending that inasmuch as his meter was taken on the 19th of December, and the revised price only took effect on the 1st of January, he was entitled to a deduction for the quantity of gas consumed between the 19th of December and the 31st. He further raised the question of the meter-card contract, already decided. The court gave judgment in favour of the company on both questions, rightly deciding, as regards the novel point, that inasmuch as it is impossible to take all the meter indexes on one day, the consumer cannot reasonably object to their being taken a few days prior to the end of a quarter.

When the proceedings of town councillors with regard to gas matters do not produce indignation, they are tolerably certain to provoke laughter. The last meeting of the Brighton Town Council was provocative of both. A report of the Corporation examiner was read, which was conclusive as to the fact that the two Brighton Companies are faithfully fulfilling the obligations imposed upon them; but the council would not be satisfied, and fell to abusing the companies. With what reason the report of their own examiner showed. Our readers have in their time heard a good deal of gas analysis, and we have innocently thought that we knew all about the constituents of coal gas. We have always believed that it was composed of a mixture of gases and vapours which need not be specified here; but Mr. Mayall has discovered, to our astonishment, that not a little mineral matter is present. He asserts that from 750 feet of the Hove Company's gas he extracted one ounce and a half of solid matter, consisting of the sulphates of iron, copper, arsenic, and magnesia! How he extracted this mixture he does not say; but he is bound to inform us. Mr. Mayall passes as a scientific man. He is an eminent photographer, who has been thought to be a chemist, and he is bound to inform the scientific world by what means he arrived at his great discovery. Until he does so, we tell him candidly that we shall not believe his statement, and we feel the profoundest pity for his brother councillors who were compelled to listen to such a story, and, from their ignorance, might be induced to accept it as a fact. There seems, however, to be one sensible man on the council, who gave consumers excellent advice as what they should do under the altered conditions of the gas supply.

A particularly lame statement of reasons has been put forward by the vestry of St. Pancras against the application of the Imperial Company for power to increase the price of gas. In one sentence, however, they concede the whole question. "It "cannot be disputed," they say, "that coal is higher in price, "and that, although some reduction has, and will, probably, still "take place, the price is likely to continue for a long time higher "than it was before the rapid advance;" that is to say, before the maximum price was fixed by the company's Act. They proceed to remark on the increased value of residuals, a matter the company will effectually dispose of when they come before the commissioners. In a section on the cost of labour they get involved in contradictions. They state first the undoubted truth, that "the "cost of labour has during the past few years considerably in-"creased," and in the next sentence they say that increased production with the same number of hands has reduced the comparative cost. On the question of leakage they can say nothing, because they know nothing; but they say that the subject of pressure requires parliamentary regulation, and we may tell them that Parliament has regulated it. We need not notice what is said about capital and the charges thereon. The large capital of the Imperial Company is no doubt a misfortune; but it has been spent, and now cannot be helped. In a memorial the vestry urge the Board of Trade not to grant the application of the Imperial Gas Company, but rather to take steps to bring before Parliament the necessity for making provision for arranging some basis for adjusting equitably the capital of gas companies, so as not to allow unnecessary capital, and to provide such a control by the municipal authorities as to prevent the companies incurring unnecessary expenditure, and also to compel them to exercise due care in the manufacture and distribution of gas; and they proceed to suggest, among other things, that the London companies, like country undertakings, by the Gas and Water-Works Facilities Act, 1873, should be limited to a 5 per cent. dividend, while they charge more than their parliamentary maximum.

The proceedings at a special meeting of the Dublin and Alliance Company show that the directors are taking the wise

step of promoting a Bill to enable them to return to their old standard of illuminating power. It would have been better if they had gone still farther and proposed 14-candle gas. They also propose to raise a very moderate amount of additional capital, and to ask for power to charter vessels so as to make a supply of coals certain. Parliament looks with so much suspicion on propositions of this kind that it had been better omitted. The Dublin Company have hardly the excuse the Chartered Company have, and these latter only obtained the sanction of Parliament with great difficulty.

We chronicle with great pleasure the compliments paid to the late secretary of the company, Mr. Stevenson, on voting his retiring allowance. The compliments were well deserved; the pension has been more than earned. We hope Mr. Stevenson will live to see the company once more in prosperous circumstances, when they will doubtless do him simple justice, and double the pension now granted. Thirty years of work such as Mr. Stevenson has performed, fully entitles a man to a retiring allowance of full pay.

The company and the Corporation of Dublin will, of course, come in collision before a parliamentary committee, and it is impossible to say what the result may be. We take it, however, that the hopes of the Corporation are not strong, and we quote with satisfaction the concluding sentence of an article in the *Freeman's Journal*, the organ of Sir John Gray, the leading advocate of the purchase by the Corporation:

> In the meantime, it says, they (the citizens of Dublin) cannot, in fairness, ask a trading company to supply them at a loss, and no reasonable man will object to an increase not made for the purpose of swelling profits, but for that of bringing the retail price into some proportion to the original cost, which has been so largely increased since the original bargain was made, and that by circumstances wholly beyond the control of the company or its shareholders.

Mr. G. W. Stevenson, who last year appeared before the revising commissioners on the part of the Metropolitan Board of Works, has this year been retained by the company, and the Metropolitan Board and the Corporation of London find it difficult to discover an engineer of eminence to take his place. We seriously condole with these local authorities, and beg to suggest to them that Mr. G. Flintoff, C.E., is ready to their hands, and to overlook him at this conjuncture would be base ingratitude. Say what they will, the present agitation is mainly Mr. Flintoff's, and it will be grossly unfair to deny him the privilege of justifying, in the witness-box, the statements he makes on the platform.

A question as to the payment of the costs of last year's revision of price, in the case of the Chartered Company, has been raised. We have never had any doubt that they ought to fall on the Metropolitan Board of Works and Corporation of London, for, although the company did not get all they asked for, they did obtain a substantial verdict which, according to all analogy, should carry the costs. Section 69 of the City of London Gas Act appears to us to relate to the costs of the company only, which are to be paid out of the expenses of general management, or out of money applicable to dividend, according as the company are successful or not in their application. It could never have been contemplated that the company should pay the costs of their opponents.

We gather that the Ryde Gas Company have accepted the decision of the Court of Queen's Bench as a defeat, and will take no steps to get the decision reversed, but show a desire to go on amicably with the Corporation. The sentiment, however, does not seem to be reciprocated. The Corporation have, it appears, already bought new lamp-pillars, and have put them up alongside those of the company. The arrangement is not considered ornamental by the Ryde people; but, of course, the company will not remove their pillars until it is convenient to them to do so. We shall wait with some interest to see whether or not the Local Government Board gives the Corporation power to borrow money for such an unnecessary outlay. The Corporation should be made to make an immediate payment out of rates.

THE WORK OF THE LOCAL GOVERNMENT BOARD.

When the Solicitor-General, in his recent speech at Oxford, spoke with something like contempt of a grandmotherly Government, under which the inspectors bade fair to be as numerous as the inspected, his allusion to the Local Government Board was unmistakeable. It has now become one of the most important administrative bodies in the State. The functions of the President of the Board are second only in importance to those of the Secretary of State for the Home Department, and a little more and justifiable consolidation would make them of equal importance. The imperial expenditure on local government administration now amounts to over £400,000 a year in England alone, and goes on increasing. It will be asked, what is done for the money? In the first place it must be remembered that the Local Government Board is only the old Poor Law Board under a new name, and charged with additional duties. The most important duty is, therefore, the superintendence of the administration of the Poor Law Amendment Act. At first sight there would appear no conceivable reason why a board of guardians, being a local authority, should not, as Mr. Chamberlain puts it, "be supreme in their special jurisdiction;" and any one who remembers the outcry against centralization in 1834, will know that in those days there was a strong opinion abroad that each parish was quite competent to manage its own affairs. Parliament, however, thought otherwise, and, adopting the Whig panacea for the cure of every evil under the sun, the Poor Law Board was constituted with its paid commissioners to control and compel the local authorities. The beneficial effects of central supervision were, we will admit, quickly apparent. The sum expended for relief, which was over seven millions in 1832, was little more than four millions in 1838. But in consequence of the increase of population, the rise in prices, and for other reasons, the expenditure has gone on increasing until, in 1871-2, the sum had reached eight millions.

We do not intend to go into any details respecting pauperism and poor law expenditure, and pass on to the other work of the Board. By the Public Health Act of 1871, the Local Government Board was made the authority to superintend the administration of the sanitary laws throughout the kingdom. The Act just referred to brought a jurisdiction quite as extensive, with duties little less onerous than those imposed on the old Poor Law Board. The whole of England and Wales is now in process of division into urban and rural sanitary districts. Existing Local Boards of Health, Town Improvement Commissions, and Municipal Boroughs, have been constituted Urban Sanitary Authorities; and Poor Law Unions, with some limitations, have been made Rural Sanitary Authorities. This has brought some 1400 separate sanitary authorities under the supervision of the Local Government Board. The duties before performed by the Medical Department of the Privy Council have also been transferred to the Board, who now superintend the administration of the Vaccination Acts, and, in fact, are a Court of Sanitary Appeal from all parts of the country. Further than this, the Sewage Utilization Acts, the Adulteration of Food Act, the Municipal Corporations (Borough Funds) Act, the Alkali Act, the Highway and Turnpike Acts, and the Metropolis Water Act, 1871, are now all worked under the Local Government Board. How the last came under the Board is not clear to us. The Act places the supervision of the water supply of the Metropolis under the Board of Trade, but it seems somehow or other to have become associated with the duties of the Local Government Board, to which department, however, the expenses do not appear to be charged. Lastly, we may mention, that steam whistles and trumpets are under the direct control of the Board. The use of these instruments must indeed be sanctioned by the local sanitary authority; but the Steam Whistles Act constitutes the Board a Court of Appeal, who may, at any time, on complaint, revoke a sanction granted by the local authority. At the present time no inspector of steam whistles, with his salary and travelling expenses, figures in the records of the Board, but that may come as the use of the instruments extends. In good time, too, we may expect that, under a sensible "grandmotherly Government," German bands and organ-grinders will be brought under some Nuisances Removal Act, to be administered by the sanitary authorities with appeal to the central Board.

It will be easily understood that the administration of all these laws involves an enormous amount of inspection. The inspector, medical or other, dogs us at every step. The maxim that "every "Englishman's house is his castle," is to-day an absurdity, and Lord Chatham's grandiloquent allusion to it is an anachronism. The poorest man may in his cottage still bid defiance to all the forces of the Crown, but he cannot keep out the Local Board inspector; and the tenement described by the great orator is the very thing that invites the intrusion. And what, up to now, has been the result of all this inspection?—we speak of sanitary, not poor-law affairs. Forty years ago we died at the rate of about 23 per 1000 annually; we die at the same rate now. We allude to this matter now because in the next few weeks we shall have to hear a good deal about it. "*Sanitas sanitatum omnia sanitas*," is the cry of a party. It simply means more inspection, more places. We have been priest-ridden, we are still lawyer-ridden, and now we bid fair to become a doctor-ridden people. Which of these tyrannies is the most insupportable we must leave each individual reader to decide for himself. The priest and the lawyer, however, we may to a great extent avoid at our option, but the doctor is forced upon us. If he could have it so, we should not be born without his assistance. As it is we cannot die, we will not say without his aid, but certainly not without his profit. If we decline his physic, we must pay to be "post-mortemized."

But, seriously, have we not gone far enough towards a "grandmotherly Government?" Is not the Local Government Board a standing reproach to the intelligence and honesty of Englishmen? Is not the existence of the Board a direct

confession that we are not fitted for local self-government? We expressed an opinion, some weeks ago, that, without some central supervision, half the Local Boards in the kingdom would be bankrupt within ten years, and we believe so still. But why should they not be bankrupt if inclined to extravagance, and are uncontrolled by ratepayers? The public who will cheerfully throw millions of money into the lap of one man, and express unbounded gratitude for the gift of a public square in return (all they are ever likely to get), will hardly object to the squandering of a few millions, with the possible results of some public improvements at home. It is the Local Government Board that stands in the way. Why should not local authorities be allowed to contract whatever loans they please, always on one condition, that they have the consent of the ratepayers? We contended successfully, when the Municipal Corporation, (Borough Funds) Act was under discussion, that on questions involving the expenditure of large sums of money the ratepayers should be consulted. This Act will be fiercely assailed in the next Parliament; and we again caution ratepayers to keep a tight hand on the purse-strings, when their money is not to be spent on productive works.

On looking at the last report of the Local Government Board, we are very much surprised at the smallness of the debt chargeable on local taxation. In 1871-2, rates, tolls and dues, and duties produced just 21½ millions, and, at the same time, the unliquidated debt charged on these sources of revenue amounted to only 63 millions. It seems clear from this that we can well afford to spend much more money for local purposes, if we had only the guarantee that it would be well laid out on remunerative works, among which sanitary works are, of course, included.

The reform and relief of local taxation is to be the principal subject of discussion in the first session of the next Parliament; and, coupled with this, we are likely to hear a good deal in favour of local authorities being left "supreme in their special "jurisdiction." To accord this would be to make a considerable alteration in the functions of the Local Government Board, and would be the first step towards emancipation from a mild form of "grandmotherly Government."

WATER AND SANITARY NOTES.

We call the particular attention of our readers to a paper we publish to-day by Mr. Deacon, the borough engineer of Liverpool, on waste and constant service for the supply of water. It is in no invidious spirit that we request our London local authorities to observe that the proceedings detailed by the author are taken by a corporate body. Whether a water supply be in the hands of a company or a Corporation, the prevention of waste is equally important; and we have nothing but praise for the Corporation of Liverpool, who have dealt so skilfully with a crying evil. The truth of the propositions laid down by Mr. Deacon at the commencement of his paper is indisputable. The dribbling away of water is a mischievous nuisance, and it is clear that all the advantages of a constant supply can be secured with a great reduction of waste. The same experience, we may say, has been gained in Norwich and other places. But these advantages are not to be secured without a complete control over internal fittings. This the Liverpool Corporation possess, and the first step in their proceedings was to ascertain where and when the waste took place. By taking district after district, and applying the ingenious registering meter of Mr. Deacon, they ascertained the fact of the waste, and then, by a system of close inspection, they decided where it took place. A renovation of the fittings being insisted upon, the waste was stopped, and a portion of Liverpool is now adequately supplied with water on a constant service at the rate of 12 gallons per head per day, in place of 33 gallons, 21 of which ran to waste. If London is to be supplied on the constant system, like proceedings must be taken, which will be attended with equally beneficial results; and whosoever may possess the supply—company or Corporation—they will thank Mr. Deacon for the ingenious instrument he has devised for their use.

General Sir W. Codrington would, perhaps, like to know the opinion of the owners and occupiers who pay water-rate in Liverpool, and the facts as to the cost and inconvenience entailed upon them by the cost of alterations, cutting off the water supply, &c., such being the information he, as a member of the Metropolitan Board of Works, is anxious to obtain from the vestries and inhabitants affected by the notice of the East London Company. We are sorry to say that we cannot furnish the information, but we think we may safely say that the inhabitants of Liverpool, not being able to help themselves, paid the money and looked as pleasant as they could; and that the inhabitants of London will do the same when the water supply is in the hands of a Corporation. We may say, further, that, so far as we know, the Liverpool public have not remonstrated, not being encouraged to do so by a local authority, and we have no doubt that in the long run they will be grateful.

The Improvement Commissioners of Northampton have a sewage farm on their hands, and, of course, it is not profitable. The land will grow magnificent crops of gigantic thistles, but the commissioners having no animals to feed on such herbage, the crops are necessarily wasted. There are, however, people in Northampton who think some profit should be made out of the irrigation of 320 acres of land with sewage, and they have bothered the commissioners to do something. Turnips have been tried, but they did not pay for the hoeing; so for the next year the commissioners have decided to leave the land fallow, and only grow weeds. With an eye to the future, however, they have called in Mr. Blackburn, of Aldershot, to advise them as to what they shall do. He has recommended the commissioners to buy 160 cows for every 100 acres, and commence with a huge dairy-farm. We shall be very glad to see the experiment tried. There is an unlimited demand for dairy produce in this country. Butter and cheese, which Mr. Blackburn has not recommended the commissioners to make, command a ready sale, and if a large sewage farm can be worked profitably, it might possibly be in this direction. We rather think, however, that a similar experiment has not been found to answer at Tunbridge, and we do not remember that Mr. Blackburn has tried it at Aldershot. We are sorry to see that, notwithstanding all the efforts of the commissioners, very bad reports are made of the condition of the water running from their works.

The detection of alum in bread appears to be the *pons asinorum* of public analysts. Why alum in bread should be considered an adulteration we never could understand. It certainly forms a compound with the gluten of flour which is said to be indigestible and innutritious, but nobody ever has proved, or could prove, the assertion. As a matter of fact, we believe that alum is seldom used by bakers, and when it is we believe it is only to enable them to make into such a loaf as the public like, a kind of flour not bad, unwholesome, or innutritious, but of a sort that will not without a little alum make the well vesiculated mass people with good reason prefer for bread. In this way alum renders an essential service not only to the baker but to the public, by increasing the available quantity of palatable food. It is notorious that some of the analysts appointed, especially in the metropolis, are incompetent. They have proclaimed themselves so, and still have accepted the appointments, and received the sanction of the Local Government Board. The consequence is, that in the metropolis the Adulteration Act is almost a dead letter. It is as well that it should be so, for probably no subject has ever provoked so much mendacity as the subject of adulteration. The recent failures, accompanied by the infliction of heavy costs on the vestries, will moderate the desire of these bodies to put the Act in force. They will also react on the Local Government Board, who insisted that the vestries should appoint analysts. Milkmen are, of course, easy game. It requires little skill to enable a man to decide that there is an abnormal proportion of water in the fluid they sell. But when we come to the detection of alum in bread, complicated chemical operations have to be gone through, for the successful performance of which much experience in analysis is required, and we can easily understand the reasons for these failures. We do not rejoice over them, for they tend to bring analytical chemistry—one of the most perfect branches of science—into disrepute. What we wish now to call attention to is the absurdly low fee—5s.—fixed by the Adulteration Act for an analysis, and the fact that the magistrate at Greenwich the other day allowed five guineas to the analyst called in as umpire. The whole subject will have to be reconsidered by the next Parliament, and in the end we may perhaps get a measure under which the fraudulent trader will be properly punished and the honest one protected, and which will be more satisfactory to the chemical profession.

We learn from Major Bolton's last report that the Metropolitan Board of Works have given an order for 30 hydrants, to be placed 200 yards apart on the mains now supplied by the Kent Water-Works Company on the constant service system. They will, of course, make the vestries pay for them, and continue to set up hydrants wherever there is a constant service of water.

We have received the annual accounts of the Metropolitan Water Companies, and hope in our next number to give a full abstract of them.

An inspector of the Local Government Board has been holding an inquiry in Dublin on the petition of the Corporation for power to borrow £50,000 for the purpose of acquiring additional land from which to take sand for the filter-beds, and to enlarge the reservoir at Stillorgan. The Corporation were opposed by the townships and the Kingstown Commissioners, but the former withdrew their opposition on the Corporation agreeing to supply water at a maximum charge of 4d. per 1000 gallons. The inquiry was concluded on Friday last, and will be reported in our next.

Communicated Article.

AMMONIACAL SALTS AND THEIR USUAL IMPURITIES.

By Alfred Payne, F.C.S.

In this paper, in response to a query in the list of subjects for research issued by the British Pharmaceutical Conference, I beg to offer to pharmacists some of my experiences in ammonia manufacture gained during the past forty years.

Bones, tar liquor, and gas liquor, are the only commercial sources of ammonia.

Up to about 1840, bones were the chief source of ammonia. They were burnt largely to produce animal charcoal and bone ash. The liquor which distils from them is rich in ammonia, 20 tons of bones yielding about one ton of rough ammoniacal salt.

The chief impurity in ammoniacal salts made from bones is the Dippel's oil. This oil is a complex body, and contains picolin, lutidin, collidin, and other compounds.

Although the elements of ammonia (nitrogen and hydrogen) occur largely in bones, the bones contain no trace of ammonia itself, nor any of the above-named principles, nor are any of these principles formed when bones decompose spontaneously; but, on the other hand, they are produced when bones are suddenly heated to redness. There is a definite temperature at which ammonia forms, and other temperatures at which oils are produced; and if the ammonia-forming temperature could be uniformly applied to the burning bones, we should increase that valuable product, and more or less avoid the formation of the offensive oils. There is also formed some phosphoretted hydrogen in bone burning, which oxidizes in the condensers, producing a little phosphate of ammonia. These two impurities, viz., Dippel's oil and phosphate of ammonia, we may expect in bone ammonia.

Since 1840, about which time bones came largely into use for agricultural purposes, the price of them has more than doubled, and their ammoniacal value has been diminished by treatment for the extraction of glue, size, and fat, so that they are rarely used now for this purpose. The ammoniacal liquor produced at gas-works is almost the only source from which commercial ammonia is now derived.

The elementary matters found in gas liquor are hydrogen, oxygen, nitrogen, carbon, sulphur, iron, phosphorus, arsenic, and sometimes traces of potassium and calcium. The proximate principles into which these group themselves are numerous, and vary much according to the temperature used in carbonizing the coals (or in gas-making), and of course they affect the purity of the salts formed from the liquor which contains them.

Coals also contain neither ammonia nor oils, and the numerous principles derived from them by distillation are formed at the respective temperatures met with in the retorts from the moment the cold coals are thrown in till the vapours arising from them come into contact with the bright red-hot sides of the retort.

Some of these principles have acid qualities, and adhere with such tenacity to the volatile alkali of the gas liquor, that they cannot be separated from it either by oxidation, distillation, or by detergent agents. For instance, we may separate the sulphur by a hydrated metallic oxide, then treat the filtrate with permanganate, and distil it two or three times, and we shall get a product sweet and brilliant; but after standing a month in a white glass bottle, a deep indigo-blue deposit forms on the glass.

Twenty years ago I formed the opinion that this deposit is a true indigo resulting from a rearrangement of the elements of the gas tar and the ammonia, and subsequent discoveries as to the constituents of gas tar confirm the impression. The tendency to form this blue deposit renders such liquor ammoniæ unfit for pharmaceutical and some other purposes.

Thus, before we can produce even plain liquor ammoniæ pure enough for use, the ammonia must be reduced by saturation to a fixed salt, and the adhering impurities then got rid of. But here a new difficulty presents itself. Part of the carbon, nitrogen, and sulphur, which the gas liquor contains, are always found grouped together as sulpho-cyanogen, and this with the ammonia forms a fixed salt, which remains as an impurity in the sulphate or chloride of ammonium, rendering those salts, if made by direct saturation, unfit for most purposes. At certain temperatures also, in subsequent operations with these impure salts, the elements assume a different arrangement, and form bisulphide of carbon; and although in this decompositon a saving of ammonia is effected, the nitrogen of the cyanogen coming out as ammonia, it does not compensate for the danger; for I have seen a strong wrought-iron still, eight feet long, blown into pieces by the accidental ignition of gases liberated in this reaction; besides which the resulting ammonia is always tinted and impure.

For these reasons, the direct saturation of gas liquor by fixed acids is almost everywhere abandoned.

If, however, the gas liquor be first distilled, the sulpho-cyanides remain behind; whilst the distillate contains ammonia, sulphur, carbonic acid, sulphide of ammonium, and hydrocarbon oils. There is great liability to loss in conducting this process on a large scale, and the most careful attention to all the physical laws concerned in it is necessary to ensure a good economic result; but on saturating the distillate, and filtering and boiling the liquor, a good white commercial salt (either sulphate or muriate) is obtained. Even this, however, will contain traces of the hydrocarbon oils and their colour-forming principles; also metallic impurities derived from the saturating acids, and from the wear and tear of the apparatus, and, if absolutely pure products are desired, it is at this stage that these impurities must be eliminated.

Solution, filtering through animal charcoal, and repeated crystallizations, will separate the hydrocarbon oils.

Magnesia salt, carefully added, will separate the phosphates (provided the solution contains a slight excess of ammonia).

Arsenic (derived either from the coals used in gas-making or from pyrites acid) may be detected by Marsh's test, using magnesium, which will also manifest the presence of copper, lead, mercury, zinc, and other poisonous metals.

If chloride of ammonium contains arsenic, it should be boiled with excess of acid, when the arsenic will pass off in vapour as terchloride.

If sulphate contains arsenic, it can be separated by boiling with zinc and excess of acid, when the arsenic passes off as arseniuretted hydrogen.

All other probable metallic impurities may be separated by first rendering the solution acid, treating with sulphuretted hydrogen, and filtering out the precipitate, then rendering the filtrate alkaline with ammonia, and precipitating with sulphide of ammonium, and again filtering bright, and crystallizing.

It may be assumed that an ammoniacal salt which has been subjected to this treatment is pure; *i.e.*:—

1. Boiling with animal charcoal, filtering, and recrystallizing.
2. Precipitating its alkaline solution with magnesium salt, and filtering.
3. Boiling (if a chloride) with excess of hydrochloric acid, or (if a sulphate) with zinc and excess of acid.
4. Treating the *acid* solution with sulphuretted hydrogen, and filtering.
5. Treating the *alkaline* solution with sulphuretted hydrogen, and filtering.
6. And, finally, recrystallizing from an accurately neutral solution, which has previously been cleansed from sulphuretted hydrogen by boiling with a slight excess of acid.

The above treatment ensures a pure salt, from which all the preparations of ammonia may be safely made when only the *legitimate* commercial raw materials have been used.

But, unfortunately, the competition of trade and the struggle to produce cheap articles lead some manufacturers to utilize waste products as saturators, by which other classes of impurities are introduced. The commonest of these is the residuum (chiefly chloride of manganese) left in the stills after the generation of chlorine. When this is used the chlorine combines with its equivalent of ammonium, but the manganese does *not* subside; it attaches itself to the cyanogen of the crude gas liquor (for, of course, these crude saturators would not be used with the distilled liquor), and thus forms mangano-cyanogen, from which results a mangano-cyanide of ammonium, a salt which can scarcely be separated from the various preparations in which the ammonia is afterwards used.

To the sesquicarbonate it imparts a red tint, often exhibited in thin lines or layers on the fractured surface; all such ammonia should at once be rejected as unfit for use.

Gypsum, or sulphate of lime, is sometimes used as a saturator in districts where mineral acids are not made; portions of this often remain as impurities in the resulting salt, but these are easily separated by careful recrystallization.

In conclusion, the pharmacist has to do with only liquor ammoniæ, sesquicarbonate of ammonia, hydrochlorate of ammonia, nitrate of ammonia.

The liquid preparations he will himself prepare from the above.

Liquor ammoniæ should make a clear and colourless solution with either nitrate of bismuth or nitrate of silver, which shows the absence of hydrocarbon oils.

The nitrate of ammonia should be scrupulously neutral, or it will be unfit for making the anæsthetic gas. For further examination, each of the preparations should be tested thus:—

For phosphates, make the solution slightly alkaline, and try magnesia salt.

For arsenic, try the acid solution in Marsh's apparatus with magnesium.

For other metals, try an acid solution with sulphuretted hydrogen, and then an alkaline solution with sulphide of ammonium.

If the ammoniacal preparations will pass this ordeal, and meet these reagents, without cloud, tint, or other indication of impurity, they may be regarded as perfect, and fit for any purpose in pharmacy or the arts.—*Proceedings of the British Pharmaceutical Conference*, 1873.

Correspondence.

TAR AS FUEL.

Sir,—The importance of this subject must be my excuse for requesting you to insert a further communication.

Mr. Anderson's experience agrees with my own as to the difficulty of consuming tar in coke furnaces.

I have, however, felt the danger of depending, in small works, on tar fuel alone—the defection of one or two ovens, through a temporary disarrangement of the apparatus or other cause, being sometimes rather serious, and consequently I have endeavoured, where the field was thus limited, to combine in one furnace the consumption of both fuels.

I cannot say, however, that my efforts were attended with the desired success. The tar I insisted should be consumed (there was an insufficient market for its sale), but the spouts were constantly being choked by the clod which accumulated in front, and it was difficult to regulate the stream, so that it should continue running, and at the same time not pass unconsumed through the furnace into the ash-pit.

Under these circumstances I was exceedingly pleased, during last autumn, to observe in one of the suburban gas-works (Waltham Cross) a simple contrivance that seemed to obviate the difficulty.

I had called upon Mr. Douglas, one of the principal proprietors of these works, and in going over them he pointed out that they had been trying the effect of a jet of steam placed so as to catch the tar stream as it fell from the spout.

The result seemed perfectly satisfactory—the tar, instead of falling in a solid cord form, was distributed in spray over the furnace, and was apparently totally consumed before it reached the coke, and this without smoke, or, I need scarcely add, the accumulation of the objectionable clod.

Mr. Douglas assured me that the steam, if properly managed, did not injuriously affect the temperature of the oven, but rather apparently, on the contrary, becoming decomposed into its elements, assisted it. I was prepared to believe this, as I had several years previously seen a jet of steam applied to meet the requirements of the Smoke Act in a saw-mill boiler furnace where much sawdust and shavings were consumed, and, as I was then assured by the manager, with most satisfactory results.

I believe I have stated correctly what I saw, but I ought to explain that I am writing from memory. The idea appeared at once clear to me, and I only took mental note of the details. A. F. Wilson.

18, *Buckingham Street, Adelphi, Jan.* 23, 1874.

SIR,—I feel very much interested in the discussions that from time to time appear in your columns on points connected with gas matters. I was rather surprised to see the way Mr. Anderson has come forward in your last impression about the use of tar as fuel for gas-ovens. It may seem rather presumptuous for the manager of a small gas-works to offer any opinion after so great a champion has marched over the ground, but let me tell Mr. Anderson that, while there is no necessity for any of "those mechanical appliances" that he discusses, there is just as little need for large "cast-iron tanks" to hold all the tar and liquor as it leaves the "hydraulic main," so as to have it hot for burning.

I have used tar in more ways than one for the same end, and have found the best results by running it direct from the main itself, thus having it always hot, and also quite free from all impurities. And, however "barbarous" it may seem to Mr. Anderson to use coke and tar together, I have seen very good results from so doing by keeping a small stream of it running steadily, and using not more than from 30 to 40 gallons per 24 hours.

I hope my brethren in the gas world will not feel discouraged by the remarks, made by an engineer to whom we have looked up as a great star, as to the "absurdity" of using tar and coke together, but, while using it, try and not abuse it. S. R.

WASTE PRODUCTS.

SIR,—Your excellent article on waste products in your last issue should do much good; and, with your permission, I should like to mention some results I have obtained the last year at the gas-works in Dublin.

When the company were in Parliament in 1871, and the illuminating power of the gas was altered from 16 candles to 20 candles, the test for purity was also altered to be not more than 20 grains of sulphur in 100 cubic feet by the referees test, instead of, as formerly, by Dr. Letheby's test.

I found, when we came to make 20-candle gas, I could not get the sulphur compounds below 20 grains, so I altered and extended the scrubbing arrangement, and the result has been most satisfactory. Not only did the sulphur compounds come down, directly the scrubbers were put in action, to considerably below 20 grains in 100 cubic feet, but the increased yield of liquor was remarkable.

I had previously been getting 15 and 16 gallons of 10-oz. liquor, but now the yield is up to 30 gallons, per ton of coals carbonized, of 5° Twaddle, equal to about 10-oz. liquor by the hydrometer.

I think this is very satisfactory, and is very near the maximum quantity that can be obtained.

I am aware, in some works, that 20 and 25 gallons are obtained from a ton of coals and cannel, but it is not very general. Yet there is no reason why every gas-works should not get 30 gallons of 10-oz. liquor per ton of coals used, and reduce the sulphur compounds to below 20 grains in 100 cubic feet.

And this I shall be happy to demonstrate to any one who may be sufficiently interested in the matter to confer with me privately.

J. SOMERVILLE.

Gilford House, Sandymount, Dublin, Jan. 24, 1874.

Parliamentary Intelligence.

GAS AND WATER COMPANIES BILLS, 1874.

The examiners of private bills, of which notices have been given for the ensuing session, have been sitting during the past week. On Tuesday they found the Standing Orders duly complied with in respect of the following unopposed petitions:—Beverley Water; Dundee Water; and the Westleigh, Pennington, and Bedford Local Boards. On Wednesday the following were passed by the examiners—viz., East Lancashire Water; Broadstairs Water (No. 1); Hartlepool Gas and Water; Grantham Gas; Wrexham Water; Leeds Corporation Water, Gas, and Improvement; and the Birmingham Gas Bills. The Woodcote Water petition was withdrawn, and the Waterford Gas postponed till the 26th inst. On Thursday the Standing Orders were found to be duly complied with in the case of the Mid Lothian Water and the Belfast Water Bills. On Friday the Wakefield and District New Water and Limerick Gas Bills passed the Standing Orders.

Legal Intelligence.

WESTMINSTER COUNTY COURT.—TUESDAY, JAN. 20.

(*Before* FRANCIS BAYLEY, *Esq., Judge.*)

TACEY *v.* THE GASLIGHT AND COKE COMPANY.

Mr. SHEPHEARD appeared for the plaintiff, and Mr. BESLEY for the defendants.

This was a claim by the plaintiff, who resides at No. 20, Holland Villas Road, Kensington, in respect of a sum of 12s. 9d., which he alleged had been overpaid by him to the defendants.

Mr. SHEPHEARD, in opening the case, said the plaintiff had been for five years a consumer of gas in the district supplied by the defendants. On Dec. 16, 1872, he received from them a notice that from and after the first day of the following January there would be a change in the quality of the gas supplied to him, and that the price would be at the rate of 5s. 5d., "or such other price as shall be approved by the Board of Trade." Subsequently to the latter date a commission was appointed by the Board of Trade to revise the price of gas. On March 24, 1873, a meter card was left at the plaintiff's house, the first written memorandum on which was the state of the index of his meter when taken on the 19th of the previous December, with the amount of consumption chargeable. After the usual heading and notice on this card there was the following statement:—"Terms: Cannel gas, 5s. 5d. per 1000 cubic feet, and 2s. 6d. per quarter for the use of the company's 10-light meter." But there was not a word about the previous notice left with the plaintiff, nor was anything said of any proceedings taken or then pending before the Board of Trade Commissioners, nor was there a reference to any other price than 5s. 5d. On April 25 the Board of Trade Commissioners made their award, but the notice of that award was not given to the plaintiff until June 24, when the state of the meter for the Midsummer quarter was made up. The plaintiff objected to pay the additional price charged to him, and the matter went on from quarter to quarter until Dec. 30 last, when the defendants cut off the gas to the plaintiff's premises.

Mr. BESLEY said there was a payment made by the plaintiff on Nov. 10 of £4 19s. 2d., which was for the gas consumed by him, calculated at the rate of 5s. 5d. per 1000 cubic feet, so that it was well known that the matter was to be disputed, and the cutting off of the gas was for the purpose of bringing the question to an issue. Finding that they could not get the plaintiff to pay at the rate of 6s. 3d., they could only enforce payment by cutting off his gas. It was cut off for one day, and then he paid 10s. 3d. under protest.

Mr. SHEPHEARD said the whole amount was paid under protest. When the company cut off his gas he paid 10s. 3d., the actual amount in dispute, and 2s. 6d. for severing the pipes. He thought the defendants must admit that they were in error as to the rate charged for the gas—that it ought to be 5s. for the period between Dec. 19 and Jan. 1—because the notice they served upon the plaintiff only took effect from the latter date, yet they claimed at the rate of 6s. 3d. per 1000, which was the price subsequently fixed by the commission as and from Jan. 1.

The JUDGE said the difference was hardly worth disputing about.

Mr. BESLEY said the difference was only about 1s. It was hardly worth discussing. The principle of the thing was more important.

Mr. SHEPHEARD said he did not expect, in arguing the case for his individual client, that he should be opposed on behalf of a great company by a learned counsel. After referring to the sections of the company's Act empowering the Board of Trade to appoint commissioners to revise the price of gas, he quoted the award made by the commissioners, which, as he said, was not communicated to the plaintiff until the 24th of June, 1873. He said the question was whether the plaintiff, having had notice that the price of gas would be 5s. 5d. from the 1st of January, 1873, was liable under the award to be charged at the rate of 6s. 3d. from the 19th of the previous December. It was a rule of the courts that a notice of that kind should be construed against the person giving it, and therefore, if there was any doubt in this case, it should be construed in the plaintiff's favour. The plaintiff, at the time the notice was given, was consuming gas at the price of 5s.; the notice informed him that from the 1st of January following the price would be 5s. 5d., "or such other price as shall be approved by the Board of Trade." These words would be read by any ordinary individual, and, therefore, by the common sense of the court, to mean "such other *lesser* price," and he believed such was the legal as well as the common sense view of the case. The company had no occasion to give any price. They might have said, "Such price as the Board of Trade shall fix;" but they deliberately put in the words 5s. 5d., "or such other price," the clear construction of which was "such other lesser price." He submitted that there had never been any other price approved by the Board of Trade; the commissioners, in the declaratory part of their award, simply said, "The maximum price chargeable by The Gaslight and Coke Company shall be 6s. 3d.;" so that the company were at liberty to charge what price they liked up to 6s. 3d. But they never gave the plaintiff notice of any other sum than that of 5s. 5d. until March 24, 1873, so that up to that time he was not liable to be charged any higher rate.

Mr. *W. G. Tacey*, examined by Mr. SHEPHEARD.

I reside at 20, Holland Villas Road, Kensington. I have lived there four or five years. During that time I have been supplied with gas by the company. Up to the 31st of December, 1872, the price I was paying was 5s. per 1000 cubic feet. On the 19th of that month I received the following notice:—"Notice is hereby given that from the 1st day of January next the illuminating power of the gas supplied to you will be increased to 23 candles; the price per 1000 cubic feet of which will be 5s. 5d., or such other price as shall be approved by the Board of Trade." This notice is dated from the company's office, the 16th of December, 1872. I heard nothing more from the company in reference to the price of gas until the 24th of March, 1873. This meter-card was then left at my house. It was several days afterwards that I heard the commissioners had issued any award.

Cross-examined by Mr. BESLEY: The handwriting in the signature to the paper now produced is mine.

Mr. BESLEY: This is a contract—the only contract upon which gas was supplied to the plaintiff. It is as follows:—"I, William George Tacey, request you to supply gas to the premises situated 20, Holland Villas Road, Kensington, in the parish of Kensington, on your usual terms (endorsed hereon); also to furnish a 10-light meter (and connexions thereto). And I agree to pay your gas-rate of 5s. 6d. per 1000 cubic feet, or other the gas-rate for the time being, and meter-rent of 2s. 6d. per quarter. Charge to commence from July, 1869, when the meter index stood at zero. The number and description of lights required are 15, various." Then there is this provision:—"Provided that nothing herein shall interfere with the rights or liabilities of either party under the Metropolis Gas Act, 1860." There are also provisions on the endorsement that, in fact, the gas-rate for the time being shall be the legal gas-rate. This contract is made with the Western Gas Company, whose undertaking rights and interests, purchases, sales, contracts, &c., were by an Order in Council dated Nov. 27, 1872, sanctioning an amalgamation of that company with the defendant company, transferred to the latter.

Mr. SHEPHEARD said he should raise no question on that point.

Cross-examination continued: From 1869 to 1872 I was supplied with cannel gas by the Western Company. During that period the company lowered the price of their gas from 5s. 6d. to 5s. I do not think they altered the price more than once. I do not belong to a Vigilance Committee at Kensington for protecting the interests of the consumers.

Mr. SHEPHEARD: How has that anything to do with the case?

Mr. BESLEY: Only as you put it that this was the case of a single individual against a great company, I wanted to show that it was the reverse—that it was the case of a single company opposed by a large combination and association.

Plaintiff: I have not joined any association for protecting the interests of the consumers, and I know nothing about them. I read the newspapers, but I do not know that in the case of Mr. Colquhoun the very point in this case was decided in the company's favour at the Marylebone County Court by Serjeant Wheeler. I do not read the JOURNAL OF GAS LIGHTING, and do not know that at the Hammersmith Police Court, in Major O'Brien's case, the same question was decided against the consumer. I do not know Major O'Brien nor Mr. Colquhoun. I only know that in Mr. Colquhoun's case I heard that he had done wrong by paying the money. I am not a member of the Kensington Vestry, and have had no communication with it, nor with anybody. I do not speak to anybody about gas. Up to the end of 1872 I paid for my gas quarterly. It never happened until 1873 that I left three quarters unpaid. I myself reckoned up the £4 19s. 2d., which I tendered to the gas company before, and which I paid them on Nov. 10 last. I think I had had two bills sent in to me between April and that time. I do not think that those bills had the award of the commissioners printed on the back in red letters. [Witness, by request, produced three bills, one being for the amount due to the end of December, and each of them having the award at the back.] I paid the £4 19s. 2d. on Nov. 10 under the belief that the commissioners had no legal power to increase the price. The company sent me notice that unless I paid the additional 10s. 9d. they would cut off the gas. It was cut off for one day and part of another. It was very bad conduct on their part, I think, to cut it off.

Mr. BESLEY: That will be a matter of opinion. There are two sides to it. They tried you for three-quarters of a year, and you did not pay.

Plaintiff: I did. I went down and tendered them the money.

Mr. BESLEY: Which they said was not the legal amount. You did not pay until November, 1873, and then only paid £4 19s. 2d., keeping back 10s. 3d.

Plaintiff: Yes; thinking they had no right to charge it.

Re-examined by Mr. SHEPHEARD: I have nothing to do with the "Vigilance Committee." I am prosecuting this case entirely at my own individual expense. In the instance referred to of Major O'Brien there is a special case pending for the decision of the Queen's Bench.

Mr. BESLEY: Do not say that; you know nothing about it.
The JUDGE: How do you know it?
Plaintiff: I have been told repeatedly of it.
The JUDGE: That is not evidence.
Mr. SHEPHEARD said that was his case.
The JUDGE: I do not understand these papers. It is for the learned counsel to explain them, I suppose. The claim for rent in March is at the rate of 6s. 3d., in June it is 5s. 5d., and the last I see is 5s. 3d.
Mr. SHEPHEARD: They have voluntarily reduced it.
Mr. BESLEY: The rate of 6s. 3d. in March is for 23-candle gas, the next is 5s. 5d. for 20-candle gas. We are bound to reduce the price when we reduce the illuminating power. It is all under the award of the commissioners according to scale.
Mr. SHEPHEARD: There is this material difference, that the company fix the price themselves. At one time it is 6s. 3d., and at another 5s. 5d.
The JUDGE: It is a question of price, and the commissioners fix the maximum price.
Mr. BESLEY: They fix *the* price. This will clear it up. There was a notice, dated June 20, in these terms:—"The directors, having communicated with the Metropolitan Board of Works, hereby give notice that from the 1st day of July next the illuminating power of the cannel gas supplied to you will be reduced to 20 candles, the price per 1000 cubic feet of which will be 5s. 5d. up to the period of the next revision of price by the Board of Trade."
The JUDGE: The fact is the company have charged the maximum price fixed by the commissioners.
Mr. BESLEY said they had charged what they called *the* price fixed by the commissioners. If they gave 20-candle gas instead of 23-candle gas they reduced the price accordingly. It was entirely a question of illuminating power. With regard to the way in which the case was framed, he thought at first that there was a claim for 2s. 6d. for cutting off the gas. But there did not seem to be a word said about that.
The JUDGE: That seems to have been paid.
Mr. BESLEY said by the 17th section of the defendants Act, 1872, it was provided that in case any person supplied with gas by the company neglected or refused to pay the amount due in respect of such supply, or the use or repair of any meter, he might be summoned before a justice, and a warrant of distress issued for the amount proved to be due, together with the costs, including the cost of cutting off the gas if the gas had been cut off by the company. Therefore if the charge for cutting off the gas had in this case been paid by the plaintiff, it could not be recovered.
The JUDGE: What do you say as to the gas-rent up to the 1st of January?
Mr. BESLEY said that, having so many customers, it was physically impossible to take the state of the whole of the meters on one day. In the year in question the plaintiff's meter was taken on the 19th of December. Next year it might be taken on the 10th.
The JUDGE: Should you not allow a proportionate sum?
Mr. BESLEY replied in the negative, because, he said, there was no specific payment in respect of any particular time. On the 10th of November last the plaintiff went to the company's offices and voluntarily paid £4 19s. 2d., making no claim in respect of the days between the 19th of December and the 1st of January. He said, "I kept back 10s. 3d., believing the commissioners had no power to authorize the charge of 6s. 3d. per 1000." Therefore he kept back the 10s. 3d. in ignorance of a matter of law, and not in ignorance of a matter of fact. It would be impossible to ascertain what quantity of gas was consumed between the 19th of December and the 1st of January, and the plaintiff did not break up his claim in that way. The fact of the meter being taken a few days before the 31st did not warrant his asking for something to be allowed in respect of the few days consumption between the two periods.
Mr. SHEPHEARD said he thought his client had actually delivered a statement showing what the difference claimed was. If that was not admitted, he should ask to put the plaintiff into the box again to prove that he did deliver such a statement.
Mr. BESLEY said the company had never had any particulars delivered.
Mr. SHEPHEARD said his client paid the £4 19s. 2d. under pressure and under protest, and when he refused to pay the 10s. 3d., he delivered a statement of particulars showing the ground on which he refused to pay.
The JUDGE: It is only 10s. 3d. that the card says was paid under protest.
Mr. SHEPHEARD said the 10s. 3d. included the consumption, at the rate of 5s., up to the 1st of January.
Plaintiff, recalled, said he delivered a copy of the protest to one of the collectors, Mr. Worthington.
Mr. BESLEY said the company had had no notice to produce such a document, nor had they any knowledge of it, but he had no objection to its production by the plaintiff. But even admitting it, there was a mistake committed by the plaintiff in calculating the price of gas at 5s. The meter was taken on the 19th of December, three days before which he had had notice that the price of gas would be 5s. 5d. He claimed a portion of this 10s. 3d. in respect of the intervening days to the 1st of January. But the broad question was this—how could it be possible that the company, with 100,000 consumers, could take all the meters on the same day? It was for the plaintiff to say what proportion of the 10s. 3d. he claimed in respect of those days. What was there to indicate, in the statement said to have been left with the collector, that he intended to rely upon those particular 13 days, he not having stated what the consumption was during those days? Possibly the gas might not have been lighted during the time; but, whether or not, it was evident that it would be impossible for the company to carry on their business if they were bound to take all the meters on the 31st of December. But he (Mr. Besley) did not think the judgment would turn upon that question. It would turn upon the question whether the company were entitled to charge 6s. 3d. while they supplied 23-candle gas, and 5s. 5d. when supplying only 20-candle gas. By the Metropolis Gas Act, 1860, under which this company were formerly regulated as to the price chargeable for gas, a maximum price was fixed, and the mistake which was made by some consumers at the present time was that they supposed the company were still under the provisions of that Act as regarded price and illuminating power. But the fact was that by the Act of 1868 the sections of the Act of 1860 (so far as they affected this company), which regulated these matters, were repealed; they had now no maximum price, and no standard of illuminating power but such as were fixed from time to time by commissioners appointed by the Board of Trade, and the price fixed by these commissioners was *the* price. The company in January, 1873, made an application to the board for a commission to revise the price, and a commission was appointed. During the time of the inquiry instituted by them the meter-card which had been referred to was left at the plaintiff's house. At that time, and until the commissioners had announced their decision, the company could not fix any price, and although a memorandum of price was made upon the face of the card, it was simply the statutory price subject to the revision. The only contract between the plaintiff and the company was the memorandum signed by him in 1869, when the plaintiff agreed to pay for the gas consumed by him "at the rate of 5s. 6d. per 1000 cubic feet, or other the gas-rate for the time being."
The JUDGE: I am quite with you as regards the commissioners charge. The company have a right to charge the price fixed by the commissioners; but should there not be some evidence of the practice of the company to take the state of the meter, not on the quarter-day, but——
Mr. BESLEY: As near as conveniently may be. If your honour limits it to that, I will at once call evidence.
The JUDGE: The contention on the other side is that you are to charge 5s. 5d., or such other less sum as the commissioners shall award. That cannot be; it is "such other sum."

Mr. *J. J. Ball*, examined by Mr. BESLEY.

I am an inspector of the company, and was formerly with the Western Company. In the Western district alone there are about 3200 meters in use. There are no special days on which the indexes of the meters are taken; it could not be done. When Mr. Tacey first became a consumer we were allowed 21 days to take the meters in that district; since then it has been reduced to 14 or 16 days. We begin 8 or 10 days before the quarter, and finish as soon afterwards as we can, so that it depends upon which particular part of the district we begin upon whether the defendant's meter would be taken during the first eight days or afterwards. That has been the universal practice, and I never heard any complaints about it. It would be quite impossible to take all the meters in one day.

Mr. *Frank Bush*, examined by Mr. BESLEY.

I am clerk in the office of the secretary of the company, and produce the Order in Council sanctioning their amalgamation of the Western Company, and giving them the benefit of all their contracts. I also produce the award of the commissioners, fixing the price of gas at 6s. 3d.
Mr. SHEPHEARD having briefly addressed the court,
The JUDGE said: The main question in the case is, whether the company have a right to make this charge. It seems to me to be plain enough that they have. An Act of Parliament has been passed, under which a revision of price may take place annually, as from the 1st of January. It is said that the company are not bound to give notice of any alteration of price, and perhaps they are not, but still it is only fair to the consumers to remind them of their contract. In this case there was a notice given some time in December, that from the 1st of January following the price of gas would be 5s. 5d., or such other sum as the commissioners might fix. I am asked to read that as "such other *less* sum." There is no reason whatever why I should adopt that construction—there does not seem to me to be anything to warrant it. This disposes of the 10s. 3d. I think, as to the other point, that it was not a payment under protest. Why did the plaintiff pay £4 19s. 2d. and reserve 10s. 3d.? If he paid any portion of the £4 19s. 2d., then it is clear that something was due. Here is his own memorandum. On his own card he makes this memorandum—"Paid £4 19s. 2d:—10s. 3d. paid under protest." With regard to the other point, it seems to me that the transaction must be dealt with in a practical sort of way. The quarter commences on the 1st of January. It is utterly impossible to take the state of all the meters on the 1st of January. From the very commencement of all gas companies it must have been the case that the state of the meters has been taken when the gas companies could take them conveniently, and I think practically the Lady-day quarter—*i.e.*, the quarter from January to March—commences from the previous taking of the state of the meter a few days before or after the expiration of the previous year, and must be so taken, whether it is one way or the other. In this view of the case I think the plaintiff is not entitled to recover one penny.
Mr. BESLEY: Your honour will give us the costs?
The JUDGE: Certainly.
Mr. SHEPHEARD: I do not know whether my friend will press for costs.
Mr. BESLEY: When we did not ask for costs in Mr. Colquhoun's case it was said that we were inviting litigation. That statement was made in the public papers.
Mr. SHEPHEARD: The plaintiff has not been contesting this on public grounds; he is not a member of the "Vigilance Committee."
The JUDGE: You should not have come here, at least. You only paid 10s. 3d. under protest. If Mr. Besley asks for costs he must have them.
Mr. BESLEY: I shall ask for costs, because I do not wish to invite litigation.
Judgment for the defendants, with costs.

Miscellaneous News.

ALLIANCE AND DUBLIN CONSUMERS GAS COMPANY.

A Special Meeting of the Shareholders was held at the Office, Grafton Street on Wednesday last, Jan 21—Mr. E. FOTTRELL, chairman of the company, presiding—for the purpose of considering the bill about to be introduced into Parliament in the coming session.
The SECRETARY (Mr. W. F. Cotton) having read the advertisement calling meeting,
The CHAIRMAN said the object of the directors was to submit to the shareholders the bill which they intended to promote in Parliament this session, and it was imperative, in order to enable them to do so, that they should have the sanction of the shareholders, which he hoped would be given. He did not anticipate that there would be any opposition to the bill, which was only dealing out a matter of justice. In 1871 a bill was promoted by the corporation for the purchase of the gas-works. The company opposed the bill, and the result was that an agreement was entered into by which the illuminating power of the gas was fixed at 20 candles. This was a mistake—an unquestionable mistake—and productive of good neither to the company nor the public. They had tested and found that, in order to make 20-candle gas, they would have to deliver it under cost price. Their proposition now was to go back to the Act of 1866, and reduce the illuminating power from 20 candles to 16 candles, and he was fully convinced that would be a popular movement. At the time of the passing of the Act of 1871, when a sort of compromise was entered into with a committee of the House of Commons as to the charge of 5s. 6d. per 1000 cubic feet for 20-candle gas, the price of cannel coals, with such mixture as would produce gas of that illuminating power, was 21s. 6d., and the present price for the same article was 40s. per ton, which made a difference of £95,000 a year. Under these circumstances, the shareholders would see that the directors were only looking after the trust reposed in them, to apply to Parliament for powers to bring back the 16-candle gas, and thereby be enabled, selling it at 5s. 6d., to give such a dividend as the shareholders were entitled to for the money invested by them in the undertaking. The next part of the bill was that empowering the company to charter or hire steam or other vessels, as times might occur—as had recently happened, when the coalowners had all in their own hands—that they might find great difficulty in getting their supplies, and the city be left thereby in darkness. The next portion of the bill was that for raising additional capital to the extent of £50,000. No doubt the capital at present was large, but their expenditure had been extremely large, and if at any time they would be called upon to make additions or extensions to the works, or to supply gas to outlying districts, they would have no money to enable them to do so. The directors, therefore, thought this was the best time to apply for power to increase the capital, and he hoped the shareholders would have confidence in the directors, and support them in promoting the bill. The chairman concluded by moving a resolution approving of the provisions of the proposed bill, and authorizing the directors to proceed with it.
Mr. D'AROY seconded the resolution, and hoped the shareholders would unanimously support the board in promoting the bill. It was apparent, when the price of coal had trebled, that they could not go on making gas, and, unless they got this relief, they would have to abandon the manufacture altogether.
The CHAIRMAN said Mr. Fitzgerald, their solicitor, was in attendance, and would explain the clauses of the bill.

Mr. FITZGERALD said the chairman had done that so fully it would be unnecessary for him to do so, but he would give any information that would be necessary.

A SHAREHOLDER: The explanations given have satisfied all the shareholders.

The resolution was then put to the meeting, and unanimously adopted.

An extraordinary meeting was then held for the purpose of confirming the appointment of Mr. W. F. Cotton as secretary, and the granting of a retiring allowance to Mr. Stevenson, the late secretary.

The CHAIRMAN said he would bring the resolution in regard to the retiring allowance to Mr. Stevenson first before them. It was—"That the shareholders approve, and hereby confirm, the articles of agreement, dated Nov. 11, 1873, whereby a retiring pension of £500 a year was granted to Mr. John Stevenson, the late secretary of the company, for his life." Mr. Stevenson had been connected with the company during the 30 years of its existence. He had an arduous task at the commencement of the company, and had devoted his youth and his energy to the reform of the gas question in Dublin. Through his labours and energy the price of gas was reduced from 10s. per 1000 cubic feet—the price at which it was selling at the time of the formation of the company—to 4s. 6d. Those who were acquainted with Mr. Stevenson's services knew that for 30 years he laboured energetically and honestly for the benefit of the company.

A VOICE: He was well paid for it.

The CHAIRMAN said no doubt, but the labourer was worthy of his hire, and Mr. Stevenson, while reducing the price of gas to the public, had enabled the directors to pay an average dividend of 7 per cent. until the unfortunate circumstance of the rise in the price of coal destroyed all prospects of it. No one regretted more than the directors the absence of dividend, but it was not Mr. Stevenson's fault, and therefore he felt confident in asking the shareholders to support the resolution brought forward by the new board selected by themselves.

Mr. BUNKER, in seconding the resolution, said Mr. Stevenson was a worthy and respected citizen, who had worked arduously and zealously in the service of the company, and it would now be unfair and unmanly to make him the victim of the high price of material and wages, which had deprived the shareholders of a dividend. The proposed allowance was no more than they were entitled to give to a gentleman who had devoted the best years of his life to their service, when he was no longer able for active work. By placing Mr. Stevenson on the honourable pension list of the company, he would still be in a position to give them the benefit of his ability and experience, and at the same time would be so bound by an instrument of law which he could not get over, that he would be unable to injure the company, and he felt great pleasure and honour in seconding the resolution, as a shareholder of some influence in the company, and he hoped it would be unanimously carried.

Mr. GEO. CREE reminded the meeting that the proposal now made was merely the substance of an agreement deliberately entered into between Mr. Stevenson and those acting for the company. A company like that could not expect to be faithfully served if it did not act in the strictest honour and good faith towards all its officers. Mr. Stevenson had well earned this pension by long and faithful labours, and he hoped the shareholders would unanimously adopt the resolution.

Mr. FOX, as one of the few survivors of those who stood at the cradle of the company, bore testimony to the indefatigable and energetic manner in which Mr. Stevenson promoted it, of which none of those who knew it at a later period could form any idea. He congratulated the shareholders on the fact that, after the vicissitudes of so many years, its recuperative and inherent merits were so great that its £750,000 of capital was worth 20s. in the pound—the market price of the securities. Mr. Stevenson had surrendered an influential position to undertake the working of the company, and his honour, which was untarnished then, was untarnished still. There was too much justice in the Irish character to subscribe to so unjust a proposition as to deprive a faithful servant of the means of comfort in his declining years, and in his opinion the pension was too small.

Mr. STOKES, as representing the Rathmines Commissioners, said they had large dealings with the company, and spoke in the highest terms of the manner in which Mr. Stevenson had conducted all the negotiations.

Mr. WATERHOUSE confirmed the statements of Mr. Fox with regard to Mr. Stevenson's early labour in connexion with the company, and on the question of the illuminating power of the gas he said he used in his place 16-candle gas, which had been praised, while the 20-candle gas had been condemned.

The LORD MAYOR, as one of the new directors, said they would be unjust to themselves and unjust to Mr. Stevenson if they made the allowance 1s. less than was proposed.

The resolution was put to the meeting, and declared carried without a division.

The CHAIRMAN then proposed the following resolution:—"That the shareholders approve of the appointment of Mr. William Francis Cotton as secretary of the company, at the reduced salary of £600 a year, payable quarterly, to commence from the 30th of September, 1873, with a right to a retiring pension and allowance in case he shall become incapable of discharging the duties of his office by reason of infirmity of mind or body or of old age, similar to that which he would have had if he had remained in the employment of the corporation." They were aware that the shareholders, at a meeting held some time ago, expressed a desire that Mr. Cotton should be appointed secretary of the company, and the directors, adopting the feeling of the shareholders committee, appointed Mr. Cotton, and that gentleman was willing to act for the company on the same terms as he had from the corporation—£600 a year—and to be placed in the same position regarding the future as if he had remained in the service of the corporation—namely, a maximum of two-thirds of his salary after being 20 years in the service and over 60 years of age. Mr. Cotton appeared to be in vigorous health, and he hoped it would be long before he would have to apply for a retiring allowance.

Mr. MACREADY said he had great pleasure in seconding the resolution. Mr. Cotton came into the place not because he had friends or relatives to support him, but because of his own intrinsic merits, and it was a great advantage to the company to get him, particularly in the circumstances they were in at the time. He fully endorsed the action of the shareholders with regard to Mr. Stevenson, that high and honourable men should be stimulated by it to do the best for the company.

The resolution was unanimously adopted.

Mr. DRIMMIE was then called to the second chair, and a vote of thanks passed to Mr. Fottrell, on the motion of Mr. D'ARCY, seconded by Mr. M'DERMOTT. In putting the resolution, Mr. DRIMMIE said the new board of directors were doing everything they possibly could in the interests of the company, and by working hard themselves and making their officers work, he hoped they would be able to give the shareholders a good dividend.

The proceedings then terminated.

OXFORD WATER SUPPLY.—We are glad to learn that the negotiations for the transfer of the water-works from the trustees to the corporation are progressing satisfactorily. The draft document sanctioning the transfer, and authorizing the corporation to raise a certain sum of money for the extension of the water-works and other purposes, has been approved by the Lords of the Treasury, and the final settlement of the matter will not, therefore, be much longer delayed.—*Oxford Chronicle.*

BAHIA GAS COMPANY, LIMITED.

A Special Meeting of the Shareholders of this Company was held at the Office, 10, Coleman Street, London, on Friday last—CORNELIUS NICHOLSON, Esq., in the chair—to consider a proposition by the directors to issue fresh capital.

The SECRETARY (Mr. A. J. Head) having read the notice convening the meeting,

The CHAIRMAN said that before he addressed himself to the special business of the day, he thought it right to state that at the close of last year the directors received, with regret, an intimation from Mr. H. P. Stephenson to the effect that, in consequence of the great pressure of business upon his hands and the state of his health, he felt it necessary to resign his office as chairman of the company. The directors saw that they had no option in the matter, and that they were bound to accept the resignation; and they then asked him (Mr. Nicholson) to resume the position which he occupied until about four years ago, when the state of his health obliged him to retire. He had consented to do so, being reconciled by Mr. Stephenson still retaining his seat at the board and acting as deputy-chairman; so that there was simply an exchange of offices, and the company would continue to have the benefit of Mr. Stephenson's great practical knowledge and experience. He would now lay before the shareholders, first, the reason why they were to be asked to give the directors power to increase the capital of the company; and, secondly, the mode in which it was suggested that this capital should be raised. It had been constantly stated from the chair that the company laboured under great difficulties and disadvantages for want of sufficient working capital. This arose chiefly from the very ineffective and incomplete way in which the works were originally constructed. First of all, they were put at one extremity of the town, and the gas had to be forced from one end of the district supplied to the other; secondly, they were ill-constructed where they were placed; and, thirdly, they were never completed, because one of the most necessary portions for economically carrying on operations—the jetty—was never constructed at all. It had been stated over and over again that the company lost from 5 to 10 per cent. in value from the way in which the coal had to be landed in Bahia in consequence of the want of the jetty. To complete this work was one reason for asking for new capital. About four years ago the company raised £5000, hoping to be able to undertake this necessary work; but at that time they had a gasholder also to erect at the extremity of their lighting—the Barra—they also had to take up some miles of mains to enlarge the distributing power and to unify the system. Those two important works had been completed, and the construction of the jetty alone remained. Probably fresh capital might have been delayed, but during the last twelve months there had been a great rise in the cost of coal and freight, equal to £1 per ton, making an additional cost to the company of £5000 a year. There had also been a great increase in the cost of iron and tubing; indeed, in every article required in the construction and maintenance of gas-works. The effect had been so to cripple the resources of the company, that the directors had been constant borrowers at the bank, raising money on behalf of the shareholders by pledging their own personal property. On the last occasion questions were asked him with reference to the then pending arbitration in relation to the disputes between the company and the Government. He was happy to state that the umpire had now given his award, which was in favour of the company. He had decided that the company were entitled to be paid the sum of £3800 for arrears up to last October; and, further, that they were entitled in the future to be paid 200 reis per lamp per night, instead of 195 reis, which the Government had hitherto paid for the public lighting. But although the arbitration had been decided in their favour, they had not yet obtained the money. The Government stated that it was not in the estimates for last year, and that they had no authority to pay until the Legislature meets in Rio next year and sanctions it. If the directors had obtained this money, it was possible they might have gone on a little longer without asking for fresh capital. They had two reasons now for seeking it—first, that they might be put in possession of sufficient working capital to do justice to the concern; and, secondly, that they might be able to put the capital upon an immutable footing, which it had not been since the redeemable shares were created. The proposal was to create £30,000 in 7½ per cent. irredeemable preference shares, which would take priority over the ordinary capital. These shares would be allotted among all the present shareholders, and £20,000 of the money so raised would be applied to the redemption of the £20,000 of redeemable 10 per cent. shares, so that for an apparent charge upon revenue of £225 the company would have, when the redemption was effected, a balance of new capital of £10,000. If the shareholders would look at the two last half-yearly statements of revenue they would find that in one there was a charge of £105, and in the other £152, making together £257 paid for interest on borrowed money during the year. Of course, if the scheme now proposed was adopted, this £257 would not again occur, so that the company would not only raise the additional £10,000 at no cost at all, but with a saving of £32 per annum. That being so, the ordinary shareholders would have no reason to complain of the creation of new capital, and as they would have the opportunity of taking allotments in the same proportion as other shareholders, they could not possibly be sufferers. The only persons who would be prejudiced by the new issue would be the holders of the redeemable shares. For himself and his friends, as large holders of that class of shares, he could only say that they were willing to suffer for the general good of the company, which would be effected by the proposed arrangement, because it would put it in a sound and satisfactory position. He concluded by moving a formal resolution to the effect, first, that the directors be authorized to raise £30,000 by the creation and issue of 1500 new shares of the nominal value of £20 each, provided that £20,000 of the money so raised should be applied in the redemption and extinction of the existing redeemable preference shares, in accordance with the conditions under which those shares were created, thereby effecting a further net increase of capital to the extent of £10,000; secondly, that such new shares shall entitle the holders thereof respectively to a dividend of 7½ per cent. in priority of the ordinary shares of the company, and taking rank as a first charge after the £20,000 of perpetual preference shares to be paid out of the profits of each year; and, thirdly, empowering the directors to take such steps as may be necessary for carrying out the foregoing propositions.

Mr. R. KING seconded the motion.

After a brief conversation, in the course of which several questions were put to, and answered by, the chairman,

The motion was put, and carried unanimously.

A vote of thanks to the chairman and directors terminated the proceedings.

SUPPER TO EMPLOYÉS OF THE ALDERSHOT GAS AND WATER COMPANY.—On Friday, Jan. 9 inst., the *employés* of the Aldershot Gas and Water Company, together with their friends, were entertained by the secretary and manager, Mr. John Wilson, to a splendid supper at the company's offices, Victoria Road. After supper, a handsome testimonial was presented to Mr. and Mrs. John Wilson by the men and officials, as a token of respect and appreciation of their kindness. Mr. Wilson thanked the *employés* on behalf of Mrs. Wilson and himself for this very kind and quite unexpected present, and said they should always esteem it a treasure on behalf of the friends present. He was very pleased to see them so enjoyable together, and hoped they would continue so during the remainder of the evening. The evening was spent in a most harmonious and pleasant manner.

WATER SUPPLY—WASTE AND CONSTANT SERVICE,

By George Frederick Deacon, M.Inst.C.E., Liverpool.

[A Paper read before the Lancashire and Cheshire Committee of the Association of Municipal and Sanitary Engineers, on the 3rd of January.]

In the following paper I propose to state, first, what appear to me to be the inducements to undertake systematically the prevention of waste; next, my experience as to the working of the district waste water meter system; and I will begin by submitting to you the three following propositions, which have failed in gaining universal acceptance, owing principally, as I believe, to the superficial manner in which the subject has been considered :—

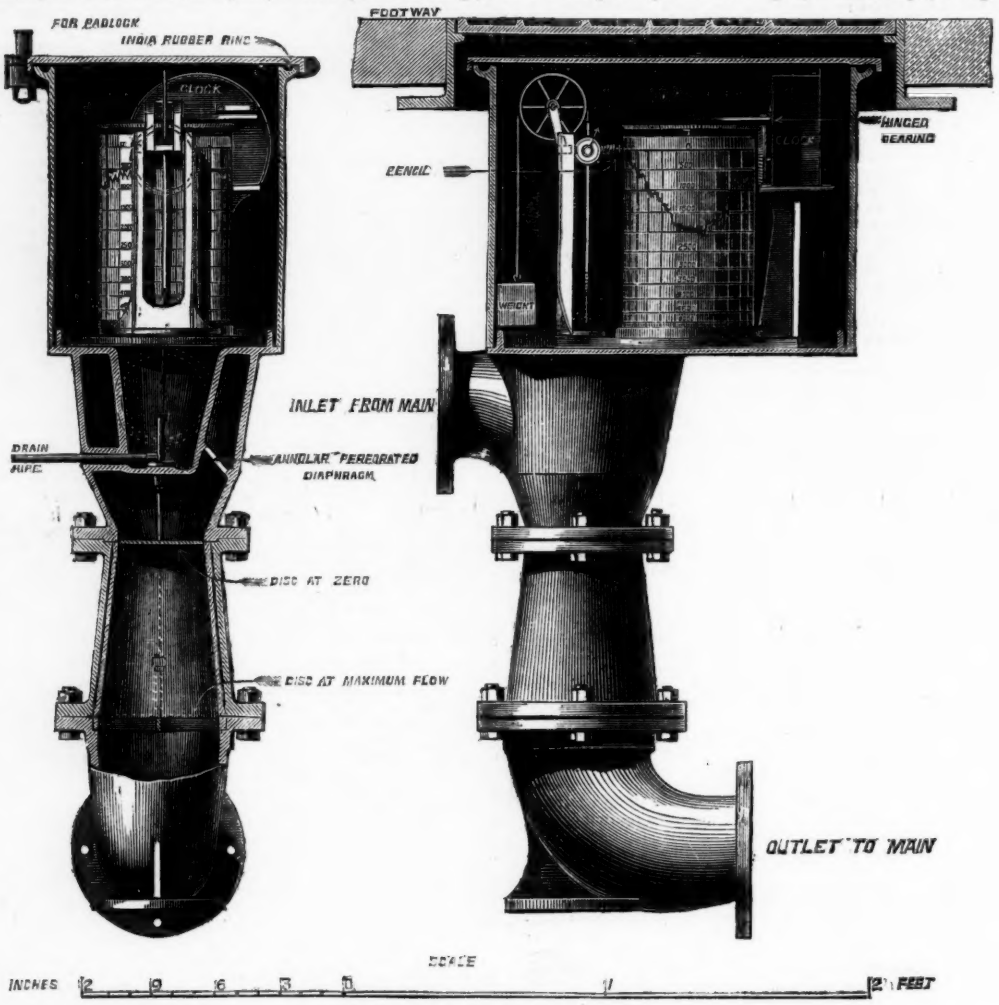
Proposition 1.—The prevention of waste of water—or, in other words, the conservation of all water not actually required for domestic or manufacturing purposes—is, or may be, accompanied by vast sanitary benefits arising from the more efficient action of existing drains, as well as from the dryness of the subsoil of dwellings.

Proposition 2.—The prevention of waste by the system hereafter described is practicable, and, apart from all sanitary considerations, it is by far the most economical mode that can be resorted to for increasing the available water supply, while it will always diminish the working expenses in cases of supply by pumping from wells.

Corollary.—Towns and districts at present supplied on the intermittent system, when the total supply is more than sufficient to meet the necessities of the people, which is the case when more than 10 to 15 gallons per head per day are taken for domestic purposes, may obtain constant supply, accompanied by a surplus of water or by a corresponding reduction in the working expenses of the supply.

With respect to the first proposition, that the prevention of waste is or may be accompanied by vast sanitary benefits, arising from the more efficient action of existing drains, as well as from the dryness of the subsoil of dwellings, I would call attention to the very prevalent notion that a town cannot have too much water, and that all the water which can be passed into the mains should, if possible, be given to it, as it is conducive to cleanliness, and as the sewers require it. The prevention of waste is assumed to be equivalent to stinting the supply, when, in reality, it may have the contrary effect. Take the common case of a town demanding 25 gallons per head per day for domestic purposes. Now, 10 gallons per head per day is probably the maximum quantity actually used for such purposes. Of the remaining 15 gallons a large proportion is lost by defective fittings and misuse, and flows down a few isolated drains to the sewers. But the maximum waste due to this cause considerably exceeds the average, and it exists where the pressure on the mains is greatest—viz., in the lower parts of the town—so that the greater part of such waste water enters the sewers near their outfalls, where it is useless; while at their upper ends, where water is most required, the supply to the sewers from this cause is trifling. Among the sewers of a town many are or ought to be permanently self-cleansing, and, without entering upon the consideration of the various circumstances which conduce to so desirable a condition, I may say that all sewers which are not self-cleansing, with the reasons why they are not self-cleansing, should be systematically tabulated, and if want of water is the cause, —which is certainly not always, and, I think, not usually so—the cure is very simple when you have a surplus of water, formerly wasted, to use for this most beneficial purpose.

Imagine the influence on a single system of sewers if only a quarter of a gallon per head per day of the population whose drains fall into it were used for flushing that system. I will give, as an example, a single existing case

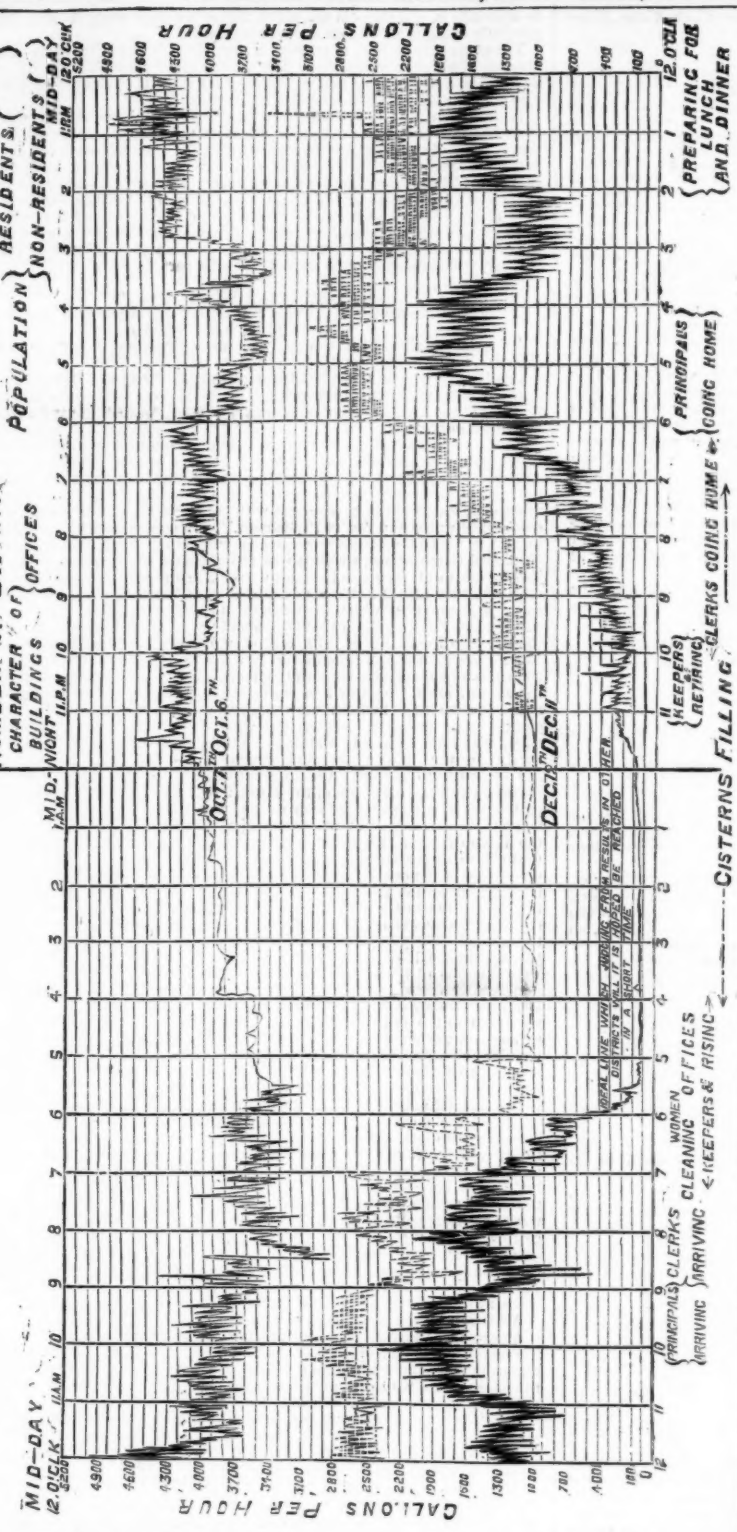


DEACON'S WASTE WATER-METER.

and in most towns there are many cases more striking. The sewer system to which I refer carries away the refuse of 52,000 persons. There are in it about 250 dead ends of branch sewers, of which probably 200 require artificial flushing to keep them absolutely free from deposit. A quarter of a gallon per head per day will give 4000 gallons for each of those sewer ends every month, a quantity which, whether flushing direct from the mains, or the tank system, which is by far the best, be adopted, is more than ought ever to be used. It would, in short, fill a 3 feet by 1 foot 10 inch sewer to the crown for 145 feet of its length.

But the private drains also require flushing. It is certain that the dribble of waste water will never flush them, the small pipes of ordinary water-closets kept running all night will never do it; but the regulating cistern delivering its two gallons through a 1¼-inch pipe will do it most effectually, and that cistern will help you greatly in your work. Of course there are other private drains, but the dribble of waste water, if it exists, is no advantage to them.

I have spoken of the proportion of the lost 15 gallons due to defective fittings and misuse, and I now come to the remainder of that quantity which leaks from innumerable defects in public and private service-pipes. This water sinks into the subsoil; it renders healthy soils unhealthy; it makes the houses damp, and certainly militates against the cleanliness of the lower orders. But its influence for harm does not end here. Part of it reaches the sewers, and even though it may get into them it can only do so by damaging the brickwork and mortar. The second proposition and its corollary is to the effect that the prevention of waste by the system hereafter described is practicable, and that it is, apart from all sanitary considerations, by far the most economical mode that can be resorted to for increasing available water supply, while it will always diminish the working expenses in cases of supply by pumping from wells; while towns and districts at present supplied on the intermittent system, when the total supply is more than sufficient to meet the necessities of the people, which is the case when more than 10 to 15 gallons per head per day is taken for domestic purposes, may obtain constant supply, accompanied by a surplus of water, or by a corresponding reduction in the working expenses of the supply. I think I may satisfy you as to the truth of this statement by giving an example of the cost of the work in a district of Liverpool where the consumption was 20 per cent. below the average before the prevention of waste under the new system was commenced, and the pipes in which, being very old, required in a great number of instances to be entirely renewed. Add to this the fact that the corporation relaid at their own cost all defective private service-pipes not within the dwellings, and you can understand that I have good grounds for saying that while the saving was a minimum the cost was a maximum. The district in question contains 31,000 persons; the saving of water between former constant and present constant supply was 21·38 gallons per head per day, and between former intermittent and present constant 7·42 gallons per head per day; and the saving of water between former and present constant service was obtained at a cost to the corporation of less than a farthing per 1000 gallons. In districts containing a better class of property the saving is often greater, while the work to be performed in obtaining that saving is far less. When we consider this in connexion with the fact that water obtained from new works usually costs 5d. or



NOTES.

1.—In this district a large proportion of the taps are supplied direct from the main, and not through cisterns, which accounts for very numerous changes of velocity. In some districts, on the contrary, the diagram is a steady curved line, only broken here and there by an isolated draw direct from the main.

2.—For special night experiments, the diagram is caused to revolve about once in four hours, by very simple means, so that the change effected by closing each individual stop-cock is the more easily read.

3.—When the variable waste due to carelessness, &c., is considerable, as shown in the diagram, it often happens that the night consumption is greater than the day consumption.

Shortly before six in the morning the keepers often stop part of this waste, and, notwithstanding evidence that water is being used, the reading is often lowered at that time. From eight to nine the consumption is usually *least*, for at that time the keepers and women have left all taps closed, and the clerks have not arrived.

6d. per 1000 gallons, we must admit the last proposition as an established fact.

The inducements to undertake systematically the prevention of waste have been laid before you in what appear to me their most striking aspects. But to those who have taken up the subject in practice many other important features, which I am unable to consider in a short paper, suggest themselves. I will, therefore, at once describe to you the method by which the prevention of waste and restoration of constant service is being rapidly carried on in Liverpool.

I believe a suggestion to place meters upon watermains has been made in former times; but it remained for Mr. J. H. Wilson, the chairman of the Liverpool Water Committee, to propose the systematic adoption of the plan, and to see it carried out with the most complete success, and with results far surpassing anything that could be anticipated.

The system I now practise and the reasons for it may be better explained if I premise that the piston-meters at first used, and which were placed upon the 3 and 4-inch service mains, indicated the necessity for obtaining not merely the total consumption for the 24 hours, but the minimum consumption during the night, and, if possible, the consumption at short intervals during the whole 24 hours. It is evident that such results could only be obtained from the ordinary meters by constantly watching and even counting the strokes. A short experience of the system, notwithstanding its great success, showed the enormous advantages which would accrue from the use of a meter so arranged as to draw a diagram representing graphically the exact quantity of water flowing through any main at every instant during the 24 hours. The great cost and wear and tear of all meters which I have tried was an additional incentive in my endeavours to produce such an instrument. The best form of the waste water meter may be described as follows:—It consists essentially of a vertical tube lined with brass, and equal in diameter at the upper end—where it is connected with the inlet from the main—to the diameter of that main, but larger at its lower end. In the tube is a horizontal disc of the same diameter as the main, with a vertical spindle on the centre of its upper face, from the end of which the disc is hung by a fine wire passing out at the top of the tube through a brass gland. This wire is connected above with a counter-balance weight, which, when the water is at rest, retains the disc at the top of the tube, which it completely fills.

It is obvious, then, that if the water is caused to flow through the instrument, the disc will find somewhere in the tube a position which it will retain until the velocity of the water changes. The lower end of the conical tube being about double the area of the main, no obstruction to the flow can take place, such as must necessarily be the case in all piston meters, while the motion for any given increment of velocity near the top, or place of minimum flow, can be made equal to, or even greater than, that due to an equal increment at the bottom or point of maximum flow, so that its sensitiveness is not diminished at low velocities—a feature which is unattainable in any meters constructed on the turbine or analogous principles.

In order to ensure the absence of any friction sufficiently great to prevent the disc and wire from reaching the exact point at which they would stand if perfectly free during the continuance of each particular velocity, I found it desirable to abandon the use of a stuffing-box, properly so called, and to substitute a single brass gland, the hole in which fits the wire accurately, but not tightly. This wire being an alloy of iridium and platinum, maintains its condition for any length of time, and the small quantity of water which oozes past it is allowed to drain away. The absolute accuracy and freedom with which the meter acts has been proved by the strictest tests. The vertical motions of the wire are registered by a pencil, connected with it, on a drum revolving once in 24 hours, the paper on which can easily be removed at any time and replaced by a sheet with horizontal lines, each of which corresponds with the height at which the pencil stands when the number of gallons per hour marked upon the line is equal to the quantity passing through the meter. The essential peculiarity then of the waste water meter is that it registers on paper the exact quantity of water passing at every instant, and the exact time and rate at which that quantity changes. The meter is fixed close to the curb just beneath the footpath. A single length of the main is removed, and a loop formed to it by two double elbow pipes. Access to the drum and clock is easily obtained by simply lifting the parapet cover and opening the inner lid.

I will now as shortly as possible describe the process of detecting the various kinds of waste and the system to be ultimately adopted in order to prevent its recurrence:—A district (of about 1300 persons) supplied by a 3 or 4-inch main having been chosen, a waste water meter is placed upon that main, and diagrams are taken for a few days before the condition of supply is disturbed. If stop-cocks outside all premises do not exist, they are at once fixed under the footway on every service-pipe; and, at the same time, a day inspector calls at each tenement and fills up a suitable form. Besides giving much information with respect to the fittings, the forms afford, in connexion with the diagrams already taken, the means of tabulating the normal condition of the supply, as in the three first lines of the following form:—

Example of Form used to record Information contained on Waste Water Meter Diagram.

——— Street, district No. —

Population—Day occupants 263
Day and night occupants 1,110

Total . . . 1,373

Rate of Consumption in Gallons per Head per Day.

Date.	Total Consumption for 24 Hours in Gallons.	Average for the 24 Hours.	Lowest Point reached.	Time of reaching lowest Point.	Average from 1 to 5 a.m.
*Oct. 4—5, 1873 ..	80,183·2 ..	58·4 ..	27·0 ..	8 a.m. ..	50·4
† 5—6, 1873 ..	81,693·5 ..	59·5 ..	39·0 ..	7 a.m. ..	52·44
† 7—8, 1873 ..	81,418·9 ..	59·7 ..	44·5 ..	7 a.m. ..	50·0
‡ 10—11, 1873..	69,479·3 ..	54·1 ..	33·2 ..	9 a.m. ..	49·0
§ 29—30, 1873..	35,698·0 ..	26·0 ..	15·0 ..	6.30 a.m.	21·0
‖Dec. 10—11, 1873.	28,252·0 ..	20·5 ..	12·7 .. 9.45 p.m. 12·2 .. 5 a.m.		15·0

Note.—The figures are those of an office district in Liverpool in connexion with which the operations for the prevention of waste are incomplete, the next step being to serve general notices and proceed with the detail examination.

In this form the 3rd, 4th, 5th, and 6th columns contain information peculiar to the waste water meter of the greatest value. The result of deducting any one of the figures in the 4th column from the corresponding one in the 3rd, is generally found to be about equal to the actual quantity of water used. Thus, from the 4th to the 5th of October, nine gallons per head per day was about the actual quantity used, while 50 gallons per head per day was about the waste from all sources. The figures in the 4th column, being the lowest rates of consumption, are reached at times when the intermittent waste due to carelessness is accidentally at its minimum, and the constant waste due to leakages in the pipes is nearly equal to these figures. When it appears that they are quite or nearly reached more than once on the same diagram, as happened on the 11th of December, where the constant waste is shown to be about 12 gallons per head per day.

The use of column 4 in the detection of waste is further shown by the following table, the figures in which are those which actually occurred in the district:—

Night Readings of Meters between One and Four a.m., at various Dates, in No. 1 District.

January 22, 1873, 30·0 gallons per head per day.
April 19, „ 9·4 „ „ „
June 27, „ ·74 „ „ „

The moral influence of the waste water inspector's presence in bringing down the figures in column 4 to those in column 5 is sometimes very curious. By referring to the actual diagrams, it will be seen that the figures in column 4 are only maintained for very short periods, often only a few seconds.

After stop-cocks have been fixed, it is desirable to issue official notices to all tenants and owners of property in the district under test, embodying the full powers of the corporation or company with respect to fittings, and explaining the steps which will be taken upon the discovery of the waste of water within any premises.

At this stage the work of discovery is commenced in earnest. At twelve on the first fine night a waste water inspector sounds each stop-cock, partly closing it, if necessary, in order to contract the passage and increase the noise. If the inmates have retired, and a flow of water is heard, the stop-cock is closed, its number and the time being accurately noted. At the same instant the meter registers the reduction in the flow of water, and the time at which it takes place. It is sometimes found desirable to arouse the inmates and enter the house, in order to obtain the necessary evidence of waste, especially when the running of water from taps is heard. In other cases the house is visited by the inspector early on the following morning, and if, while he is within, another inspector outside turns on the stop-cock there is generally no difficulty in detecting the source of waste at once. If, however, the waste is not superficial, sounding with the teeth at the taps and other fittings will generally discover a leak in the buried pipes. Each source of internal waste having been discovered by these means, the greatest care must be exercised by the inspectors to ensure its remedy in the best possible manner.

In most districts the whole of the stop-cocks may be sounded by one inspector in a single night; but a large number of such night inspections, followed by day inspections and repairs, are always necessary before the internal waste is nearly removed. A test for the condition of pipes is conducted as follows, and generally with most valuable results:—Any convenient section, say one-fourth of the district, is isolated from the remainder by a valve, and commanded by the meter. In this sub-district all the fittings are closed and tied with string, a number of men being employed for the purpose, and each having several houses to watch. The stop-cocks are then closed one by one, and, the time being noted, waste in the pipes of any premises is thus discovered and measured. The following statement shows the various classes of defects in 14 waste water districts in Liverpool, containing an aggregate of 3000 persons:—

Notices issued for Defects.

	Cocks.	Ball Cocks.	Water-Closets.	Pipes.	Total.
Total for 14 districts . .	713 ..	5 ..	555 ..	1232 ..	2665
Simple Repairs by Inspectors.					
Total for 14 districts . .	253 ..	58 ..	55 ..	28 ..	394
Total noticed and repaired					3076

Tests for leaks in public pipes are conducted as follows:—The condition of the main and branches to the stop-cocks may be ascertained by closing those stop-cocks entirely, when any flow must be due to leakage. By sounding closed stop-cocks, and all other exposed meter work connected with the pipes, that leakage may often be localized. An internal examination of the neighbouring sewer on a dry night may lead to many important discoveries, especially if large isolated leakages exist. If, however, the pipes are old, and the meter indicates a considerable flow, it is well worth while to strip them entirely, having at hand new pipes with which to replace the old ones, if thought desirable.

It only remains for me to point out the means by which I propose to maintain the condition of comparative freedom from waste in those districts in which a fair normal consumption has been attained. Taking, for example, a town of the size of the borough of Liverpool, containing 500,000 persons, there will be about 300 waste water districts, and 300 waste water meters. Unless the consumption of a district has suddenly become abnormal, it is not objectionable to leave each diagram on for a week, and to allow the seven diagrams to be superimposed upon each other. Each day fifty diagrams will be removed and replaced by blank sheets and brought to the office.

The work can easily be performed by two meter inspectors and two boys, with the reserve of one inspector and one boy, who, in addition, will wind up the clocks, and do any other necessary work in connexion with the meters.

Any district the consumption in which the diagrams brought in shows to have increased unduly, will be excluded from the general inspection, and omitted by the ordinary meter inspector. Two or three special inspectors will at once be sent into it, and there is no doubt that a few days work, or even less, will generally bring it back to its normal condition.

The advantage of such a system is manifest. Without it waste water inspectors discover only superficial defects, and spend their time equally on good and bad ground; but the best evidence of its value is the unprecedented success which is attending its adoption in Liverpool.

I do not now propose to speak of what I really think we shall be able to do here, but the result up to the present time is, that out of a population within the borough of about 500,000 persons, with eight to ten hours supply, and without the borough of about 125,000 persons with constant supply, taking in each case about 24 gallons a head (excluding only water used for trade purposes), we commenced work in a district within the borough of 31,000 persons, who were taking only 19½ gallons a head in the eight or ten hours, and 33½ gallons per head per day when on constant service, and that we have given and continued the constant service, and reduced the consumption to 12·17 gallons per head per day, which is maintained without the slightest difficulty.

* Saturday afternoon and Sunday morning. † Normal condition of district.
‡ Taking census, inspecting and making sundry small repairs.
§ Fixing stop-cocks. ‖ Stop-cocks fixed.

BIRMINGHAM TOWN COUNCIL.

PROPOSED AMENDMENT OF THE MUNICIPAL CORPORATIONS (BOROUGH FUNDS) ACT.

A Special Meeting of this Council was held on Tuesday, Jan. 20—the MAYOR (Mr. J. Chamberlain) presiding.

The MAYOR moved the following resolution—"That the General Purposes Committee be authorized to memorialize Her Majesty's Government and petition Parliament in favour of an amendment of the Municipal Corporations (Borough Funds) Act, 1872, by repealing the requirement of a meeting and poll of owners and ratepayers in the case of opposition to a bill prejudicially affecting the interests of the corporation, and also the following proviso in section 2—viz., 'Provided that nothing in this Act contained shall authorize any governing body to promote any bill in Parliament for the establishment of any gas or water works to compete with any existing gas or water company established under any Act of Parliament.'" In supporting the proposition, he said that he had received various communications from the Association of Municipal Corporations, which it was the pleasure of the council they should join by means of an annual subscription. Some of those communications had only just been placed in his hands, and he must ask the opinion of the council as to the manner in which they desired to deal with them. The most important was the suggestion that they should petition against certain clauses in the Borough Funds Act of 1872, and of that desire expressed by the association he was informed in time to put it upon the notice paper; but as at that time he was not acquainted with the facts, he only gave notice generally that the council should be asked to consider the propriety of opposition. Since that time he had had an opportunity of communicating with the town-clerk, and also of conferring with Mr. Alderman Hawkes, who, they all knew, was a walking dictionary of municipal law. Acting partly on the advice he had received, he was now prepared to ask the council to accept the resolution which he had just moved. He might call the attention of the council to the fact that the association suggested that they should petition against three clauses in the Act. This first was the requirement of an absolute majority of the governing body—that was, the Town Council. He could not recommend the council to petition against that clause, as it seemed to him a reasonable proposition that there should be a majority of the council in favour of taking such important action as parliamentary opposition to a bill. But as regarded the other two, he recommended the council to comply with the request made to then. They had an instance of the difficulty attending the Borough Funds Act at the present time before the council. They were desirous, in case the negotiations with the gas companies should fall through—which he sincerely trusted they might not—they were desirous of having a *locus standi* in order to oppose the bill of the Birmingham Gas Company. In order that they might do so, they had, under the Borough Funds Act, to go through an appeal to the ratepayers, to put advertisements in the papers and notices on the doors of every church and chapel throughout the borough; and it seemed to him, inasmuch as the council was a popular and representative body, enjoying the confidence of the constituency, it might be a continual source of embarrassment if appeals were made to the ratepayers themselves. He should say that he was informed that the Borough Funds Act did not really make any new restriction. On the contrary, while it extended the powers of the council, it hampered and embarrassed them by delaying and disclosing the nature of the course pursued. In other words, by the old municipal law the course required to be taken was so absurd that it was continually ignored, and the council, in common with other corporations, had put it entirely on one side in the passing of bills in Parliament. But at the present time, and with this new Act just placed on the statute-book, it would be hazardous to adopt the same course. As regarded the second suggestion, he was informed that the council, under any circumstances, would be permitted, or, at all events, could not be prohibited, applying for an Act. At the same time this section prohibiting them applying to Parliament to establish gas or water works to compete with any existing company was calculated to embarrass them, in consequence of their inability to go to Parliament.

Alderman HAWKES seconded the motion.

Alderman AVERY said he very much regretted that he could not vote for the resolution, in consequence of the first part of the notice not being retained, requiring the council to obtain the sanction of the owners of property and the ratepayers. He very much objected to any act on the part of the council intended to impeach the 3rd section.

The MAYOR said his proposition would do away with the necessity of appealing to the ratepayers and owners in case of opposition to a bill, but it would not do away with the necessity of an appeal to the ratepayers and owners with regard to the promotion of a bill.

Alderman AVERY, with that explanation, would not offer any opposition to the resolution, and in the remarks he ventured to make he wished it to be understood that he was not expressing any approval of that limitation. On the contrary, he believed it had produced serious embarrassment in the management of affairs.

The resolution was then put and carried.

BIRMINGHAM GAS COMPANY'S BILL.

The Public Works Committee made a report in which they stated that they had considered the parliamentary notice and bill of the Birmingham Gaslight and Coke Company, and they recommended that they be authorized to present petitions to both Houses of Parliament against the bill, in order to secure a *locus standi* for the purpose of obtaining the insertion of any clauses that might be considered necessary for the protection of the public, and also empowering such other proceedings in the matter as might be deemed expedient.

The report having been received,

Mr. HEATON proposed that the committee be authorized to present a petition to Parliament against the bill of the Birmingham Gaslight and Coke Company, and take such proceedings in reference thereto, in the name and on behalf of the council, as they might think proper. He explained that this was a matter of form, with a view of placing the council in a proper position in case anything was necessary to be done.

The resolution was duly seconded and carried.

MEDICAL OFFICER OF HEALTH.

The Sanitary Committee made a report in which they stated that, in pursuance of the instructions given to them by the council, they had ascertained that the exclusive services of Dr. Hill could be obtained for a salary of £1000 per annum, and the committee made the following recommendations in refer-

ence thereto:—1. That the whole of the services of Dr. Hill, the medical officer of health and public analyst, should be given to the borough. 2. That Dr. Hill's offer be accepted, the council having already fixed the salary at £650 per annum for his partial service. 3. That the proposed payment by the Local Government Board be accepted, the committee considering that it will tend to promote the efficient discharge of the duties appertaining to the appointment. 4. That an application be made to the Local Government Board to pay one-half of the salary of the medical officer of health, in accordance with their proposition contained in their letter of Aug. 19, 1872.

Dr. BARRATT moved—"That in consideration of Dr. Hill's exclusive services being given to the council, and his foregoing all private business or any other public appointment, his salary of £650 per annum be increased to £1000, the increase to be computed from that day." He said that from information supplied to the committee by Dr. Hill they had ascertained that his income as medical officer and public analyst, with other public appointments, amounted to about £925 per annum, which his private practice increased by a sum of £300 or £400. Knowing that was so, when Dr. Hill made the offer to forego all private occupation, the committee unanimously felt that they could not ask or desire that he should offer his exclusive services at a lower sum than £1000. The committee felt it highly desirable that they should have the entire time and services of Dr. Hill at their disposal. With regard to the question of applying to the Local Government Board to make a provision, the committee had come to the conclusion that the arrangement would be an advantage to them. He was bound to say that his opinion on this point had considerably altered of late. He used to have a strong objection to the Local Government Board having any control over their officers, but the more he thought and considered the matter, the more was he satisfied that he was wrong in this, and he believed so long as the corporation did its duty they had no right to fear or anticipate any bad results arising from the arrangement. As regarded the manner in which Dr. Hill had carried out his duties, his exertions had met with the unanimous approval of the committee.

Mr. COOK seconded the resolution, and advocated the principle of the council having the entire control of Dr. Hill's services. He thought, too, they should place Dr. Hill in an independent position, where he would not be affected by any influence outside. A great deal of irritation was caused by the late prosecutions, and it was difficult to see how Dr. Hill could serve the council thoroughly while he had to cater among the same class of customers with whom his public duties might bring him in collision. The duties of Dr. Hill's offices naturally increased as the town increased in population, and, bearing in mind the Local Government Board provision, he thought the resolution was in the interests of economy. The connexion with the Local Government Board he did not believe would be at all objectionable, and he did not know that it would not be beneficial when such matters as the sewage injunctions had to be considered by them.

Alderman YATES opposed the motion on the ground that it was premature, the council not having as yet decided to accept the offer of the Local Government Board. He characterized the report as a very crude one. The conclusion the committee seemed to have come to was that they should give Dr. Hill £1000, and then obtain a grant of half that amount from the Local Government Board, so that in reality they would be paying only £500. That was an erroneous manner in which to look at the matter. Dr. Hill served two offices; he was the medical officer of health and the public analyst. The medical officer was appointed under one Act, and the public analyst under another. Under a section of the Public Health Act they would find that the council could claim half the salaries paid to the medical officer of health and the inspector of nuisances. As medical officer of health, Dr. Hill already gave all his services to the town, for by the terms of his appointment he was, while restricted from medical and surgical practice, allowed to practise as an analytical chemist, only on condition that it did not interfere "with the proper and efficient discharge of his duties." The report did not give them enough information on the question of salary. It might either mean that they were to give him £1000 as medical officer of health, and an additional £150 as public analyst, or it might mean that they proposed to give him £850 as medical officer, and another £150 as public analyst to make up the salary. If the latter was the case, they could only go to the Local Government Board for £425. On the ground that the report did not give them sufficient information, he moved, as an amendment, that it be referred back to the Sanitary Committee, with instructions to report more fully on the recommendations contained therein.

Mr. J. TAYLOR seconded the amendment, because he thought the proposed increase of salary could not be justified except on the ground that the salary Dr. Hill was at present paid was not sufficient to enable him to devote sufficient time and attention to the discharge of his duties, but he was not aware that any fault had been found with Dr. Hill at present. The real question to him seemed to be, was the officer properly paid or not, and then did he discharge his duties properly or not. Supposing they accepted the Government offer, the money would come from the Consolidated Fund, and so out of the taxes of the country. If Dr. Hill was not properly paid now, give him what was required, and not accept the Government aid. This centralization meant taking away from them the control of their own officers.

The MAYOR said he thought it right to say that this matter did not come before the council in the form of an application from Dr. Hill for an increase of salary; on the contrary, as a recommendation from the committee that his entire services should be secured to the borough at the salary named. As far as Dr. Hill himself was concerned, he had sufficient knowledge of the matter to enable him unhesitatingly to say that personally Dr. Hill would prefer to remain as he was.

Alderman HAWKES agreed with Alderman Yates, and remarked that the council were not yet informed whether the Government would adhere to the terms of their circular letter of August, 1872; and also that the council had not as yet affirmed the principle of accepting Government aid. He then proceeded to speak in favour of accepting assistance from Government in this matter, remarking that the old argument used against the centralization of local affairs did not apply in this case. In sanitary matters it was a great advantage to be connected with the Central Government, who were able to obtain the highest scientific assistance and the most enlightened advice that could be procured on such matters. They accepted Government aid in regard to the police and the board of guardians. On a question of health there could be no question about what they should do. It was a crusade of science and skill against disease, misery, and death. There could be no possible objection to accepting the assistance of a popular Government in a matter affecting the sanitary condition of the people. He concluded by moving as an amendment—"That in the opinion of this council it is expedient to accept the proposal of the Local Government Board, contained in their circular letter of the 19th of August, 1872, to repay, out of the money voted by Parliament for that purpose, one-half of the remuneration of the medical officer of health for this borough, such officer being appointed in accordance with the regulations issued by and subject to the approval of the Local Government Board; and also to accept a similar payment with respect to the inspector of nuisances, appointed under the like regulations and with the like approval; and that the report of the Sanitary Committee now before the council be referred back to the committee, with instructions to inform the Government Board that it is proposed to obtain the exclusive services of Dr. Hill as medical officer of health and public analyst for this borough, and to inquire from that department whether, under the altered circumstances, the board will pay one-half, or what other proportion of the salary of Dr. Hill, and also whether the Local Government Board will pay one-half of the salary of the inspectors of nuisances, and that the said committee do report the result of such inquiries, together with their recommendations thereon, to the council."

Mr. BARROW seconded the amendment, remarking that he thought it was of the utmost advantage to them that the Government should have some control over their officers. It rendered a man more independent, a quality which was peculiarly necessary in a medical officer of health for a place like Birmingham.

Alderman BIGGS supported the amendment of Alderman Yates.

Alderman BRINSLEY spoke strongly in favour of the same resolution.

Mr. EOLASON opposed the original motion, and was decidedly against accepting any Government provision. He hoped the council would see that it was well able to manage its own business, and did not require the assistance of Government. So long as he had been a member of the council he had upheld the principle that it should be supreme in all local matters, and he hoped it would not be departed from.

Mr. THOMASON supported Alderman Yates's amendment. He did not want any Government interference with the affairs of the corporation. Officers of the guardians had not performed their duties so well since they had been removed, to a certain extent, from the control of the board, and he thought the connexion was to be strongly objected to.

Alderman CORNFORTH said the mayor had told them of his high opinion of the principle of local self-government, but the principle now sought to be introduced would entirely destroy it. It involved accepting Government assistance, which meant accepting Government control. If they were going to say they were not capable of managing a matter involving only a question of a few hundred pounds, how could they possibly go to the burgesses in the future and say they were capable of managing a concern like the gas-works, that would hang about their necks a dead weight of several millions? What would the burgesses think of them?

Dr. BARRATT, in the course of his reply, agreed to accept Alderman Hawkes's amendment, but the mayor ruled he could not do so.

Alderman Hawkes's amendment was then put to the meeting and lost by 22 to 19, and Alderman Yates's amendment having been accepted as the substantive motion, was put to the council and carried.

BRIGHTON TOWN COUNCIL.

THE GAS SUPPLY IN THE BOROUGH.

A Meeting of the Town Council was held on Wednesday last, the 21st inst.—the MAYOR presiding.

The following report from Mr. Edward Moore (the corporation gas analyst) was presented:—

The Black Rock Company.

The average of ten observations gives a value equal to . .	14·71	in standard candles.	
The highest value was	15·2	"	"
The lowest value was, ...	14·56	"	"

The gas showed no trace of sulphuretted hydrogen. Not having been supplied with my test meter for sulphur, no operations were possible.

The Hove Gas Company.

The average of ten observations gives a value equal to . .	14·53	in standard candles.	
The highest value was	15·0	"	"
The lowest value was	14·43	"	"

The remarks on impurities, as previously given, apply to this company.

Remarks.—The gas from both companies being now tested with the new burner, these figures show that the advantage this burner gives to the companies in supplying a low quality of gas has been and is being taken.

Summary for the Year 1873.

Under this heading, I have since 1867, when I first undertook the gas testing, reviewed the result of the year's work in testing illuminating power and purity. From the exceptional condition resulting in the powers obtained by the Hove Gas Company in Parliament, and since conceded to the Black Rock in their contract for public lighting, any analysis of the figures obtained in my monthly reports would give but a confused idea of their value as illuminating power in standard candles. From January until July, both companies gas was tested with the now obsolete burner; since that date, with the exception of August, when the return of the Black Rock was made with the old burner, both companies gas has been tested with the Sugg London Argand, and the figures given are in accordance with the increased capability of light-giving power that burner has over the old. During the months of September and October, the gas consequently showed a high comparative value; since then both companies, particularly the Hove, have gradually declined their illuminating power, and are now taking to themselves nearly all the value the substitution of the new test burner was intended to effect on their behalf.

The testing for sulphurous impurities, so far as the Hove Company is concerned, is provided for in a clause of their Act, and refers to sulphuretted hydrogen only, by simply using the test paper. At my suggestion, in 1868, with the approval of the Gas Committee, the apparatus invented and used by Dr. Letheby, analyst to the City of London, for estimating sulphurous impurities of gas, was obtained, and has since, without any intermission, been used at least once, and sometimes more frequently, every month. The Black Rock Company's gas has always shown a moderate and sometimes a small figure; the Hove Company's gas, previous to the date of their removal to their new works, frequently gave a much larger proportion by comparison. Since then the average of testings shows no more than is, as a rule, found in the gas of the principal metropolitan companies, who are under penalties not to show more than 20 grains in 100 cubic feet.

The average of the Black Rock Company works out at 14 grains; that of the Hove at 17 grains. In the last week of November, the test meter, that has been in use for nearly five years, gave evidence during my operations of requiring repair. It was consequently sent to the maker by your surveyor, Mr. Lockwood, and it has not yet been returned to me, although I have repeatedly applied for it.

My interest in gas not being confined to simple testing, and bearing in mind the important fact that the power conceded to the Hove Gas Company, enabling them to reduce their illuminating power as well as increasing their price 6d., is for one year only, it is of the last importance to the public that the working of this company should have a close attention during this particular year. In the evidence given at the Houses of Parliament, the manager of the company stated he had completed a contract by which, when the coals were delivered at the works they would cost 29s. per ton. Allowing for loss by leakage through the 60 miles of main belonging to this company 10·49 per cent., the make of gas per ton was 8465 cubic feet; this selling at 4s. per 1000 gives in round figures 33s. 6d. Until very recently their coke has been charged at 30s. per chaldron of 13½ cwt., the residuals, tar and ammonia, that were nearly valueless, are now, from their utilization in manufactures, commanding good prices. The marked decline at this season of the year in the price of coal points to a reduction in the price of gas at no very future date, and coupled with this I hope an increase in the illuminating power to at least 15 candles. (Signed) EDWARD MOORE, Gas Analyst.

Test Office, Town Hall.

Mem.—The test meter has been returned and is now in operation.

Mr. MANWARING moved the adoption of the report.

Mr. MAYALL said he was very pleased to see such an able report from Mr. Moore. It appeared to him that the powers conceded to the gas companies by Act of Parliament, with respect to the new burners, would be of great advantage to the companies themselves, though not so, perhaps, to their customers. With the inferior gas he would show them what would be likely to happen. From 720 feet of gas he had extracted one ounce and a half of solid matter, consisting of sulphate of iron, sulphate of copper, sulphate of arsenic, and a large quantity of sulphate of magnesia. He would appeal to Sir Cordy Burrows as to whether it was right that they should breathe an atmosphere impregnated with such gas as this. He did not think the gas companies had any right to poison a whole population in this way. The gas companies, he contended, ought to buy better coal, because all inferior coal produced the kind of gas which he had spoken of.

Mr. BOOTH: What company's gas did you experiment upon?

Mr. MAYALL replied that it was the Hove Company's gas. Mr. Moore ought to have subjected the gas to a more crucial test than he did.

Alderman REEVES asked Mr. Mayall to state the exact weight of the 720 feet of gas before it was burnt.

Alderman Cox remarked that every one could test gas himself by getting a piece of sugar of lead and dissolving it in water. If it burnt black, it would indicate that it was impure. The average quantity of sulphur in the gas was something like 14 or 15 grains to the 100 feet. The Corporation of London allowed 20 grains. This meant that the gas-burners in the street, which burnt 4 or 5 feet in the hour, would, in 20 hours, make about 14 grains of sulphur; but this would only be like striking so many lucifer matches in the room, each match containing one grain of sulphur.

Mr. LUTLEY said he thought it would be worth while for the Gas Committee to go to Chichester to ascertain what had been done there, as he knew that in that town they had gas of less cost than at Brighton, and very much more illuminating power.

Alderman WEBB complained that the gas was very impure, and that it destroyed all the brasswork in a house. He had been obliged to substitute iron for all his brass picture rings, &c., in the whole of his establishment, through the action of the gas, which was now dearer and not so good.

Mr. FABIAN remarked that since the price of gas had been raised it had not been so good.

Mr. TANKARD made some remarks to the same effect; his gas bill this Christmas was nearly double what it was last, although he had not any more burners in use.

Mr. MANWARING said the council ought to be very much obliged to Mr. Moore for the way in which he had spoken of the matter. He had no doubt that the time would come when they would be able to go more fully into the matter; but at present the committee had no power. The statement made by Mr. Mayall had astonished him, and he had no doubt it had equally astonished the council. Now that the illuminating power was not so good, it was necessary that their fittings should be altered, and he advised them to keep their burners clean. The committee obtained the best possible information they could, and if they did not satisfy the council, they would be glad of a hint from any gentleman in order that they might do so.

The proceedings were then confirmed.

METROPOLIS GAS SUPPLY.

METROPOLITAN BOARD OF WORKS.

At the Meeting of this Board on Friday last, the Works and General Purposes Committee made the following report:—"Your committee have to report that they have considered the letter from the Westminster District Board, referred to on Dec. 19 last, transmitting copy of a notice received from The Gaslight and Coke Company, respecting damage that might be caused to the company's mains, &c., by the use of steam road rollers, with a view to this board taking such action in the matter as the interests of the public require. Your committee have received from the solicitor a report, in which he states that he cannot find that this board has any other powers under the Locomotives Acts of 1861 and 1865 than those of regulating the speed and hours of working, but that in the Act of 1861 power is given to the Secretary of State to prohibit the use of locomotives destructive to highways or dangerous to the public; and that a clause is also inserted giving any person right of action, should any locomotive be constructed and used so as to cause a private or public nuisance. If, therefore, the company have any claim in this case, it would, the solicitor presumes, be against the Westminster District Board, as the owners of the steamroller. Your committee beg to submit the report of the solicitor, and recommend that the substance of it [be communicated to the district board." On the motion of Mr. Newton the recommendation of the committee was agreed to.

LAMBETH VESTRY.

At the Meeting of the Vestry of this parish on Thursday last, it was resolved, on the motion of Mr. Barker, to convene a conference of delegates from the respective metropolitan vestries, to consider the present state of the gas question, and suggest measures for practical reform.

CITY OF LONDON COURT OF SEWERS.

At the Meeting of this Court on Tuesday last, Mr. Jesse Turner's notice of motion—"That this court do co-operate with the Gas and Water Committee in opposing the application to the Board of Trade, under the City of London Gas Act, 1868, for an increase in the price of gas, and do refer it to the Streets Committee for that purpose," was ordered to stand over until the next meeting.

METROPOLIS WATER SUPPLY.

Major Bolton, in his report of the water supplied to the metropolis during the month of December last, states that the condition of the river at Hampton, Molesey, and Sunbury, where the intakes of the West Middlesex, Grand Junction, Southwark and Vauxhall, Lambeth, and East London Companies are situated, was good during the whole of the month. The highest flood state of the river at Hampton during the month was 1 inch above the (6 feet) summer level, and the lowest 3 inches below. At Ditton the state of the water in the river during the month was good for 25 days, indifferent for 3 days, and bad for 3 days, but was much affected by the filthy and turbid state of the river Mole. The highest state of the flood water at this place was 5 inches, and the lowest 1 inch above summer level. The highest temperature of the water during the month was 46°, and the lowest 38°, while the highest temperature of the air at the same place was 50°, and the lowest 19°. These observations were made daily at 9 a.m. The rainfall during the month was ·38 inches. Hydrants might now and for some time past have been substituted for fire-plugs upon about one-third of the entire mains of the metropolis which are constantly charged, but they have not yet been supplied. The number of miles of streets containing mains constantly charged and upon which hydrants could at once be fixed, in each district of the metropolis, is shown in the return. The Kent Company are now giving constant supply in Deptford, and having applied to the Metropolitan Board of Works, in conformity with sect. 34 of the Metropolitan Water Act, 1871, for instructions for affixing hydrants to the mains in this portion of the company's district, the board has given orders for 30 hydrants to be erected at distances of about 200 yards. The New River Company have now the power of affording effective constant service in their district. The company have in a number of cases afforded constant supply by means of stand-pipes, and have agreed with a committee of the Corporation of the City of London to furnish constant supply at once to a large number of the houses of the poor situated in courts within the City bounds, and the arrangements of the officers of the corporation in connexion therewith are now in course of completion; negotiations are also pending for the erection of a number of hydrants in the City.

PROPOSED CONSTANT SUPPLY BY THE EAST LONDON COMPANY.—At the meeting of the Metropolitan Board of Works on Friday last, a motion was made by Gen. Sir W. Codrington to the following effect:—"That this board having received and circulated amongst its members a statement from the directors of the East London Water-Works Company in favour of their proceedings in enforcing their constant water supply to 6406 houses, he will move that the statement be referred to the vestries and inhabitants of the parishes affected, in order that this board may also know the opinion of the owners and occupiers who pay the water-rate, and the facts as to the cost and inconvenience entailed upon them for alterations, cutting off the water supply from 800 houses, &c. That the engineer of the board be directed to extend the inquiry now being made so as to obtain this and other information of a similar nature from the inhabitants upon whom a constant supply, and the regulations for it, have been enforced." Mr. Leslie seconded the motion, which was agreed to.

EDINBURGH WATER SUPPLY.

Mr. J. Falconer King, the analyst for the City of Edinburgh, has forwarded to the municipal authorities the following analysis of the South Esk water, one of the proposed new sources of supply which the corporation are seeking power by the bill they are promoting in the coming session of Parliament to appropriate:—

Report of Analysis of Samples of Water received from the Edinburgh and District Water Trust.

Laboratory of Edinburgh City Analyst, Leith, Jan. 17, 1874.

On Tuesday, the 13th inst., I received from the Edinburgh and District Water Trust 30 samples of water, which were duly sealed and labelled, and said to have been taken from the South Esk, near Gladhouse Mill, every day (Sundays excepted) from Dec. 8, 1873, till Jan. 10, 1874. From each of these 30 samples I took a few ounces of water, which, having thoroughly mixed, I subjected to a careful analysis, and obtained the following results:—

	Grains per Gallon.
Matter in suspension, chiefly of vegetable origin	0·88
Matter in solution	5·04
Volatile ingredients, chiefly vegetable	1·04
Fixed ingredients, consisting mainly of lime and magnesia salts	4·00
Nitric acid	trace.
Chlorine	0·72
Ammonia	0·004
Albumenoid nitrogen	0·013
Hardness	2·72°
Colour	22°
Colour of water supplied to city on 16th inst.	15°

From these results it will at once be seen that this water is well suited for domestic use.

The amount of suspended matter it contains is very small, so that it can hardly be detected by the eye. The dissolved ingredients which are present are the same as those found in all ordinary river and spring water, and in the proportion in which they occur in this water are perfectly harmless. I have very carefully tested the water for deleterious substances such as are formed by the decomposition of animal matter, or arise from infiltration of sewage, or drainage from highly manured fields; and I have found the proportion of these to be so minute as to be barely discernible.

The hardness—which arises from the presence of lime and magnesia salts—while it is by no means excessive, is sufficient in amount to free the water from the imputation of being so devoid of saline matter as to be objectionably soft.

The extent to which this water is coloured is somewhat greater than that of the Crawley water as supplied in Leith at present, but this difference is so small that, though it can readily be seen when the water is viewed in deep column, it is quite inappreciable when that is contained in tumblers or other vessels in ordinary domestic use.

The conclusion to which I have come, and which is deduced solely from my investigation upon these samples of water sent to me, is, that this water, as it possesses an agreeable taste, a moderate degree of hardness, no objectionable colour, nor notable amount of any deleterious ingredient, is well suited for use as a potable water, and for the domestic supply of a city such as Edinburgh.

(Signed) J. FALCONER KING, City Analyst.

NORWICH WATER-WORKS COMPANY.

The Half-Yearly Meeting was held on Wednesday last—Mr. H. S. PATTESON in the chair.

The CLERK (Mr. R. Cooper) read the directors report as follows:—

The accounts of capital and revenue for the last half year, now read by the secretary, have been audited in the usual manner, and certified to be correct.

After payment of the expenses of the half year, and of the interest on debentures and dividend on preferential shares, there remains a sum enabling the directors to declare a dividend upon the ordinary share capital at the rate of £5 10s. per cent. per annum, leaving a balance of £274 13s. to the credit of the next half year's account; and they have declared a dividend at that rate, which will be paid to the shareholders at the end of ten days from this date.

The directors have the pleasure to report that the water supply to the city throughout the late summer was exceedingly good and pure.

The company's revenue continues to increase, but such increase is absorbed by the high price of coal and the additional amount required for local rates. The directors have, however, been fortunate in obtaining an excellent quality of coal, from which satisfactory results have been obtained.

The CHAIRMAN, in moving the adoption of the report, congratulated the shareholders upon the fact that the directors were able to pay a dividend of 5½ per cent., notwithstanding the greatly increased expenditure there had been in respect of coals and rates. In the year ending September last they paid exactly £989 more for coals than they did in the year ending September, 1872, while for the last half year the expenditure was £390 in excess of what it was a year ago. Then the rates had been increased £163 in the year—£81 10s. for the half year—so that the expenditure for coals and rates amounted to £470 more than in the corresponding half of last year. This would account for the directors not paying more than 5½ per cent. But the business was extending gradually, and, no doubt, when coals came down, they would be able to return to payment of the old dividend. Mr. Hawksley was unable to be present at this meeting, but having gone through the works on the 23rd of December, he had sent his report of their condition in the following letter:—

30, *Great George Street, Westminster, S.W., Jan.* 20, 1874.

Gentlemen,—I have the pleasure to report that I have recently inspected your works at Heigham, and that I found every part of the machinery, structure, and apparatus in excellent condition and perfect working order. The filter-beds were operating very satisfactorily, and the quality of the water supplied to the public was alike good to the taste and brilliant to the eye.

The working expenses of the past year have necessarily been greatly augmented by the considerable increase in the price of coal. I believe, however, that the excessive rates which have prevailed during the last two years will not be maintained, and that the directors may calculate upon considerable reductions within the ensuing twelve months.

The effect of the new covered reservoirs is very observable and very gratifying. The quality of the water filtered at Heigham is no longer deteriorated by exposure to light, heat, and air, and hence it is delivered to the consumer in exactly the same condition in which it is received from the filter-beds. The pressure is also more constantly maintained.

I beg to express my sincere regret that I should be at the time unable to adapt my usual visit to the day upon which the annual meeting is held.

(Signed) T. HAWKSLEY.

The Chairman and Directors of the Norwich Water-Works.

The motion for the adoption of the report was seconded by Mr. R. CHAMBERLAIN, and carried.

The retiring directors and auditor having been re-elected, on the motion of the CHAIRMAN a vote of thanks was given to Mr. Ayris for the admirable manner in which he had conducted the business of the company.

Mr. AYRIS, in acknowledging the compliment, said that he should have greater pleasure in meeting the shareholders when they went back to 6 per cent. He had done his best to maintain the rate of dividend. He could, however, keep it at the present rate, and he hoped it would again be 6.

On the motion of Mr. JARROLD, seconded by Mr. FITCH, a vote of thanks was given to the chairman and directors for their services, and the chairman having acknowledged the same the proceedings terminated.

THE BRIGHTON CORPORATION AND THE HOVE GAS COMPANY.—At a recent meeting of the Gas Committee of the Brighton Town Council, a letter was read from the town-clerk's London agents, stating that they have, in accordance with instructions, tendered to the secretary of the Brighton and Hove General Gas Company the sum of £581 15s. 4d., in payment of the corporation's account with the company to the 30th of September last, and that he had declined to receive the money on the ground that the sum was less than the amount due.

ANALYSES OF SPENT OXIDES FROM GAS PURIFYING.

By George E. Davis.

	I.	II.	III.
Sulphur	64·376	62·358	67·956
Ferric hydrate	14·421	17·112	15·335
Insoluble	11·052	5·099	8·304
Moisture	2·079	5·387	3·900
Lime (combined with S)	2·399	—	—
Sawdust	2·470	1·776	1·002
Calcium carbonate	—	5·135	3·006*
Ammonium sulphocyanide	2·662	1·324	1·102
,, chloride } ,, cyanide }	0·605	—	—
,, ferrocyanide	—	1·663	—
Iron ferricyanide	trace	0·366	trace
	100·064	100·220	100·605

The following is the analysis of a sample of the burned oxide:—

	Wet.	Dry.
Moisture	15·228	—
Insoluble	28·302	33·386
Ferric oxide	44·420	52·399
Calcium sulphate	11·288	13·315
Sulphur	0·762	0·200
	100·000	100·000

—*Chemical News.*

THE NORTHERN COAL TRADE.

(from our own correspondent.)

We have reached the last week of January, and some idea may be formed of the prospects of the coal trade of Northumberland and Durham. Households have been slack the whole of the month, and the trade is duller now than it was at the beginning. The remarkable mild weather has enabled south country merchants to keep out of the market; and during the past fortnight there have been a very limited number of orders to hand from the British Channel ports and from the east coast. The continued dulness of households is affecting other branches of the coal trade, and steam coals were flat all last week, with a tendency to lower prices. Several of the collieries in these trades have commenced to make stock. In the early part of the month the gas coal trade was flat, but the week before last more animation was put into it. Last week, however, this improvement was barely sustained. Manufacturing coals are becoming cheaper. Contracts are being made for the year at 30s. per chaldron for mixing coals to be supplied to the chemical factories during the year. The remarkable mild weather, whilst it has to some extent cut off the demand for household coals, is keeping most of the northern ports of Europe open, and the merchants and gas-works in these parts have ample opportunity of maintaining a good supply. Of course, coalowners are saying that this dulness is usual at the present time of the year. But whether it is or not, it is in striking contrast to the condition of the coal trade in 1872, and it indicates, in the opinion of impartial persons, that the trade is getting back somewhat to its normal state. There is a very large amount of tonnage in the northern coal ports, with very little employment for coasting vessels. In consequence of this, all classes of freights are lower, and several ships are laid by waiting for better times. The chemical trade of the North has been in a depressed condition for the last three months, and shows very few signs of improvement. Manufacturers are shortening the production. The opening weather is enabling manufacturers to get their goods away to the Continent without stoppage, and there is more business at present in the fire-brick and gas-retort trades than there was three weeks ago. The iron trade of the northern district was a little slack last week, and, except in the manufacture of locomotive and marine engines, there is nothing special to note in the iron trade of Newcastle. There are large orders for locomotives in the Newcastle shops, and several heavy castings have been done for new colliery work, which is being extended on all sides in the pit districts of Northumberland and Durham. There is a stir amongst the mechanics engaged in the engine factories of Newcastle for more wages.

CHEMICAL, MINERAL, AND METAL REPORT,

For the Week ending Jan. 24, 1874.

(*From Messrs.* Berger Spence and Co.'s *Circular.*)

Chemicals.—Since the date of our last report the chemical market has pursued a remarkably even course, the improved tone previously noticed being maintained in a satisfactory degree, and prices generally established on a firmer basis than when the year opened. The alkalies have been without change in price, and, with the exception of soda crystals, have all been in fair demand. There have been two public auctions of potash salts in London this week, one of nitrate and one of chloride, but in neither case was a sale effected. Nitrate of soda has been in active demand throughout, and it closes at about 10s. per ton dearer. Sulphate of ammonia unchanged in value, but the feeling is towards an improvement, and the home demand, for agricultural purposes, is increasing.

Minerals.—With only a moderate demand prevailing for minerals, the market has remained quiet, prices tending in favour of buyers, and sellers seemingly more anxious to dispose of their produce. In the coal trade there is in some cases a disposition to stock rather than sell at reduced prices, and even some producers have chose to limit the production, but either course can only be local in its influence, and cannot permanently affect the market. Upon the whole, it may be stated that the situation is gradually becoming more favourable to the consumer, and it would be better were the producers to accept what is inevitable with a greater show of grace, and submit to the natural course of events without adopting false schemes for maintaining their high prices. The Board of Trade returns have fully proved the evil that has arisen from this cause, and it would be a pity if the industrial activity of the country should this year be again cramped by the anomalous prosperity of colliers and colliery owners. Iron ore remains in fair request, but the absence of Spanish supplies is still a source of complaint.

Metals.—There is not any improvement in the market, and the business doing is limited in extent and at rates ruling in favour of the purchasers. How far this latter may extend it is difficult to predict, but if any further reduction is to take place, more especially in iron, it must be accompanied with corresponding effects on the prices paid for labour and fuel, and as these are almost certain to be resisted by the parties interested, it does not appear likely that any immediate or considerable reduction is imminent or desirable. Scotch pig iron warrants in the early part of the week were firm, but at the close showed signs of weakness. The shipments for the past week are returned at 7236 tons, against 9386 tons in the corresponding period of 1873. Middlesborough iron is unaltered in value. There is no improvement in the demand for manufactured iron in South Staffordshire. Copper is quiet, but there does not seem any disposition on the part of holders to press sales, and the present position of this metal would favour the supposition that higher rates may yet be realized. Tin is easier, with a moderate demand. Despite prognostications, there is yet no reduction in the price of lead, nor are smelters very apprehensive of any such alteration. Spelter is dull, and few sales are taking place; at the same time there is not much depreciation in its value.

* The carbonate of calcium in these samples obviously shows that the oxide and lime were used in the same purifiers.—Ed. J. G. L.

Normanton Public Lighting.—It was resolved at the meeting of the local board, on the 20th inst., that the streets of this growing town, which have hitherto been in darkness, shall be lighted with gas.

Boston Water-Works Company.—The directors of this company have determined to recommend to the shareholders, at their annual meeting next Thursday, the payment of a dividend of 8½ per cent. This is the highest figure yet reached in the history of the company. For the last three years the amount paid has been 8 per cent.

Huddersfield (Corporation) Gas Supply.—At the monthly meeting of the Huddersfield Town Council on the 21st inst., it was resolved, on the recommendation of the Gas-Works Committee, that the corporation should purchase from the Moldgreen Gas Company, at the price of £17,000, the whole propet y, undertaking, and works of the company, and all plant, fixtures, and fittirngs, mains, services, and meters, belonging to the company, and also all the stock of coals and all other stock belonging to them, and also their gas-rentals, rights, interests, and privileges from Jan. 1, 1874, including their veto privileges held under the Huddersfield Gas Act, 1851.

Chichester Cathedral Campanile as a Water Tower.—A local paper says that the proposal by the New Water-Works Company to erect a water-tank in the campanile of Chichester Cathedral is again creating considerable uneasiness in the "ancient city." Speculation is rife as to the result of the next meeting of the Chapter. It is stated that the venerable dean will oppose the scheme in an uncompromising manner. The proposal will further have to receive the sanction of the bishop and archbishop, and it is extremely doubtful if such will be obtained. However, in the event of the promoters inducing these authorities to consent to the scheme, certain gentlemen have resolved to fight the issue in a court of law.

Stealing Gas at Blackburn.—At the Blackburn Borough Police Court, on Monday, Jan. 19, William Harrison, Henry Hayhurst, and Robert Blakoe were charged with being illicit manufacturers of whisky, and with stealing 57,600 cubic feet of gas, belonging to the Blackburn Gaslight Company. Harrison was the occupier of a provision shop in Emily Street, and Blakoe resided in a cottage adjoining. The police had for some time suspected that in Blakoe's house there was an illicit still, and on Saturday afternoon Chief Constable Potts, Superintendent Eastwood, and four other police officers, and two Excise officers, visited the house, and there found a complete distilling apparatus in full work. The gas used in heating the stills was being taken from the gas company's mains without the knowledge of the comany. One of the prisoners had once been fined £100 at Liverpool for a similar offence, and another of the prisoners, an old man, stated to the police that he had distilled whisky illicitly for 40 years without being caught. The prisoners were remanded for a week.

Neath.—Proposed Transfer of the New Gas Company's Works to the Town Council.—At the meeting of the council, on the 19th inst., the clerk read some correspondence which had recently passed between him and the gas company, the substance of which was that the directors considered it necessary for the council to pay a sum of £33,000 for the undertaking, before any further negotiation could go on, and that the gas company cannot allow any examination of their books. He also read the resolution passed at the last meeting, which stated that the corporation were prepared to purchase the works for an amount which was to be equal to the outlay of the company, and 5 per cent. on the share capital. The sum named was £29,500, but it was not considered final until the books should be examined. So far the gas company and the corporation had been in unison, but now the recent communication of the company was that £29,500 was insufficient, and that until £33,000 was agreed to, negotiation could not go on, and that even for the confirmation of these figures, the books could not be submitted to the examination of the sub-committee. After some conversation it was resolved—"That the Neath New Gas Company be informed that the Sanitary Authority will hold them to their agreement contained in their letter of the 30th of December last, which was accepted by the authority's letter on the 6th of January inst., and that the clerk be requested to call upon the gas company to furnish a statement of their liabilities, with a view to an early settlement of the details of price."

Preston Gas Company.—The annual meeting was held on Monday, Jan. 19—Mr. J. B. Booth in the chair—when the following report was submitted:—"The directors have the pleasure to recommend the payment of the usual dividend for the past half year of 10 per cent. per annum on stock A and 7 per cent. on stock B. The revenue, though showing a small reduction in the amount received for gas, may yet be considered satisfactory. Considerable requisite alterations are being made at the Walker Street works, but the directors anticipate that the extra income arising from the enhanced price of coke will more than meet the expenditure. The directors have to record with regret the death of the late William Howitt, Esq., whose energy and attention to the interests of the company during the short time he was a member of their board, had rendered him a very valuable colleague. Major Thomas Mounsey has been elected to fill the vacancy. The term for which Mr. Davies was appointed auditor expires on the 19th inst., but he is eligible for re-election." The balance-sheet is attached to the report, and the revenue account for the year has been as follows:—By gas and meter rents, £41,640 9s. 4d.; coke, £9331 2s. 9½d.; tar, £1797 17s. 9d.; salts, £1008 6s. 8d.; sundries, £138 4s. 2d.; total, £53,916 0s. 8½d. Expenditure:—Cannel and coal, £17,374 5s. 9d.; manufacturing expenses, wages, lime, and water, £5076 5s. 10d.; general expenditure—bricklaying, retorts, mechanics and repairs of works, pipes, meters, &c., £8109 11s. 10d.; salaries and office expenditure, £2303 11s. 9d.; rates, taxes, and ground rents, £1364 17s. 7d.; interest on loans, &c., and commission, £1123 3s. 4d.; law charges, £9 19s. 2d.; balance carried to dividend account, £17,854 5s. 5½d.; total, £53,916 0s. 8½d. The report and statements of accounts were passed, explanations of several items being given by the chairman. The customary dividends of 10 per cent. and 7 per cent. were declared to be payable on Monday, the 2nd of February. On the nomination of Mr. Newsham, the thanks of the meeting were voted to the chairman and the trustees of the company for their assiduous attention during the past twelve months.

Richmond (Surrey) Water Supply.—The inhabitants of the higher districts of Richmond have for some time past complained of the supply of water. At a meeting of the Select Vestry on Tuesday last, the plans laid before them by Messrs. Russ and Minns, according to instructions given them on the 16th ultimo, were approved, and ordered to be forwarded at the earliest possible date to the Local Government Board, in order that the amount estimated may be borrowed for carrying out the works, namely, £30,000; Messrs. Russ and Minns, in a published report, have indicated the different sources from which water may be obtained, and the opinion of the highest scientific authorities fully confirms the soundness of their choice in selecting the chalk beneath the London clay as that from which to get a water supply for Richmond. The site chosen for the pumping-station is the old brewery at the end of Water Lane, as offering many important advantages, especially its proximity to the river, giving facilities for obtaining condensing water for the engines, easy delivery of coals, and saving of depth of well. The well is proposed to be 8 feet 6 inches internal diameter for a depth of 100 feet, then decreased to 7 feet diameter for the next 120 feet, and from this depth to the chalk (which is expected to be reached at a further depth of 56 feet) of 5 feet diameter. When the chalk is reached a boring of 18 inches diameter is to be sunk in it, making a total depth of 420 feet. Powerful engines are to lift the water to high and low service reservoirs—the former in Richmond Park, the latter near the Union Workhouse. The service is to be constant, and under sufficient pressure to command the tops of the highest houses in the district. It is estimated that the water may be supplied at 6d. in the pound on the rateable value of the houses.

Share List,
OF
Metropolitan Gas and Water Companies.

(Corrected by Mr. F. N. GOLDING, Sun Court, Cornhill, from the latest Stock Exchange Quotations.)

Number of Shares issued.	Amount per Share.	Name.	Amount paid up p. Share.	Dividend p. Cent. p. Annum.	Latest Quotations.
	£	GAS COMPANIES.	£ s. d.	£ s. d.	£
8600	20	Anglo-Romano	20 0 0	10 0 0	22 — 24
5000	20	Bahia (Limited)	20 0 0	3 0 0	9 — 11
1000	20	Do., preference	20 0 0	10 0 0	25 — 27
750	20	Do., do., redeemable	20 0 0	10 0 0	22 — 24
40000	5	Bombay (Limited)	5 0 0	6 15 0	5⅞ — 6¼
10000	5	Do., fourth issue	4 0 0	6 15 0	½—1 pm.
10000	20	British (Limited) (Norwich, Hull-Souleoates, Hanley, Tunstall & Shelton [Potteries], Trowbridge., and Holywell.)	20 0 0	10 0 0	33 — 35
7500	20	Cagliari (Limited)	20 0 0	7 0 0	15 — 16
120000	10	*Chartered* A shares	10 0 0	10 0 0	14½— 15
20000	10	Do., A	10 0 0	10 0 0	14⅞— 14⅞
10000	10	Do., B shares, 4 per cent. max.	10 0 0	4 0 0	6⅞— 7⅛
25000	10	Do., 5 per cent. preference	10 0 0	5 0 0	13 — 13½
20000	10	Do., 5 per cent. preference, second issue	10 0 0	5 0 0	12⅝— 13¼
20000	10	Do., 10 per cent. preference	10 0 0	10 0 0	19½— 20
12000	25	Do., D shares	25 0 0	10 0 0	48⅝— 49½
437250	100	*Commercial*	100 0 0	10 0 0	156 —158
20000	20	Continental Union	20 0 0	8 0 0	20½— 21½
20000	20	Do., new	12 10 0	8 0 0	par—½ pm.
10000	10	Do., new, 1872	2 10 0	8 0 0	¼ dis—¼ pm.
10000	20	Do., preference (Grmny.: Strsbg. France: Cette, Nismes, Montargis Vienne, Roanne, Beaucaire, Rueil, Albi. Italy: Milan, Genoa, Parma, Modena, Alessandria, Messina.)	20 0 0	7 0 0	23 — 25
5000	10	*Crystal Palace District*	10 0 0	10 0 0	15½— 16
5000	10	Do., preference	10 0 0	6 0 0	12⅛— 13½
1000	10	Do., new shares	10 0 0	7 0 0	11 — 11½
23406	10	European (Limited)	10 0 0	8 0 0	16 — 17
12000	10	Do., new shares (Boulogne, Amiens, Rouen, Caen, Havre, & Nantes.)	7 10 0	8 0 0	4½— 5⅛
4054	10	Foreign and Colonial (Limited)	10 0 0	..	9 — 10
5000	10	Hong Kong (Limited)	10 0 0	10 0 0	13 — 13½
1560000	100	*Imperial*	100 0 0	10 0 0	157 —159
26000	12½	Do., new shares	12 10 0	7 0 0	15 — 15⅝
1300	100	Do., bonds	£100	10 0 0	195 —200
56000	50	*Imperial Continental* (Amsterdam, Berlin, Ghent, Hanover, Lille, Rotterdam, Aix-la-Chapelle, Antwerp, Bordeanx, Brussels, Frankfort-on-Maine, Haarlem, Stolberg, and Vienna.)	43 15 0	9 2 6	52 — 54
3000	40	*Independent*	40 0 0	10 0 0	64 — 66
3000	10	Do.	10 0 0	5 0 0	8 — 9
3000	20	Do.	20 0 0	7 10 0	24½— 25½
	10	Do., D	1 0 0	..	
250000	Sk.	*London*	100 0 0	10 0 0	157 —159
£15000	Sk.	Do., 1st preference	100 0 0	6 0 0	117 —120
	Sk.	Do., 2nd preference	100 0 0	6 0 0	
	Sk.	Do., 3rd preference	100 0 0	6 0 0	
£18781	100	Do., 1st preference stock	100 0 0	6 0 0	
£11828	100	Do., 2nd preference stock	100 0 0	5 0 0	
15000	5	Malta and Mediterranean (Limited)	5 0 0	5 0 0	2 — 2½
6000	5	Do., preference	5 0 0	7 0 0	5 — 5⅛
20000	5	Mauritius (Limited)	2 0 0	7 0 0	2 — 2⅛
25000	20	Monte Video (Limited)	20 0 0	..	23½— 24½
8000	10	Nictheroy, Brazil (Limited)	10 0 0	..	2½—2 dis.
30000	5	Oriental (Calcutta)	5 0 0	9 0 0	6⅞— 7
30000	5	Do., new shares	2 10 0	9 0 0	⅛—1 pm.
10000	5	Ottoman (Limited)	5 0 0	nil.	1⅞— 2¼
17500	10	Pará (Limited)	10 0 0	7 0 0	7⅝— 8⅛
27000	20	*Phœnix*	20 0 0	10 0 0	32 — 33
5600007.	100	Do., new	55 0 0	7 10 0	69 — 71
1440007.	Sk.	Do.	100 0 0	5 0 0	92 — 94
5000	20	*Ratcliff*	20 0 0	10 0 0	31½— 32½
36000	20	Rio de Janeiro (Limited)	20 0 0	10 0 0	31 — 32
7359	5	Singapore (Limited)	5 0 0	7 10 0	4½— 5
2000	5	Do., preference	5 0 0	7 10 0	5½— 6
1500	32½	Shanghai	32 10 0	12 0 0	30 — 32
4000	50	*South Metropolitan*	50 0 0	10 0 0	84 — 86
4000	12½	Do.	12 10 0	10 0 0	20½— 21½
20000	12½	Do., new shares	5 0 0	10 0 0	4⅜—3¾ pm.
15000	10	*Surrey Consumers*	10 0 0	10 0 0	15½— 16
10000	10	Do., new	7 0 0	10 0 0	4¼— 4⅜
9000	4	United General (Limerick)	4 0 0	2 10 0	1¼— 2¼ pm.
1500	10	*Wandsworth and Putney*	10 0 0	10 0 0	14 — 15
1500	10	Do.	10 0 0	7 10 0	11 — 12
2957	10	Do.	10 0 0	7 0 0	
993	10	Do.	3 0 0	7 0 0	
16000	5	*West Ham*	5 0 0	10 0 0	7⅞ — 8¼
10000	5	Do., new shares	1 10 0	10 0 0	3—3¼ pm.
		WATER COMPANIES.			
60000	10	Berlin	10 0 0	11 10 0	20 — 22
12000	100	Chelsea	100 0 0	6 0 0	116 —118
1800000	100	East London	100 0 0	6 0 0	120 —121
8000	50	Grand Junction	50 0 0	8 10 0	74—76xd.
5840	25	Do., ¼ shares	25 0 0	8 10 0	38 — 39
2160	25	Do., new do.; maximum dividend, 7½ per cent.	25 0 0	7 10 0	31 — 33
4396	100	Kent	100 0 0	6 0 0	121 —123
5339	100	Lambeth	100 0 0	6 5 0	120 —121
1161	100	Do.	20 0 0	6 5 0	
442	100	New River	100 0 0	8 0 0	170 —180
4443	100	Do.	30 0 0	8 0 0	36 — 38
400000	100	Do., debenture stock, 4 per cent.	100 0 0	4 0 0	96 — 98
3036	100	Southwark and Vauxhall	100 0 0	5 10 0	99 —101
1296	100	Do., preference stock	100 0 0	5 0 0	100 —101
	100	Do., D shares	100 0 0	5 10 0	98 —100
		Do.	..	4 10 0	
	100	Do., new ordinary	..	4 10 0	
1600	100	Do., new ordinary, No. 1	40 0 0	4 10 0	
12172	61	West Middlesex	61 0 0	£6 per sh.	120—122xd.

Price Current.

CASTINGS.—*Per Ton.*

Average Weight of Cast-iron Gas-pipes, per Yard.

1 in.	2 in.	2½ in.	3 in.	4 in.	5 in.	6 in.	7 in.	8 in.	9 in.	10 in.	12 in.
16	21	28	33	51	70	89	107	126	149	177	208 lbs.

Retail Prices are 5 to 10 per cent. higher.	London.	Glasgow.	Newcastle and Middlesboro'.	Wal s.	Yorkshire, Derbyshire, and Staffordsh.
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Pig Iron, No. 1 (g.m.b.)	—	5 7 0	6 7 6	6 0 0	6 5 0
1½ and 2 inch Socket-pipes	11 0 0	10 10 0	10 10 0	10 10 0	10 10 0
2½ and 3 inch do.	10 10 0	9 15 0	9 10 0	9 15 0	9 15 0
4 and 5 inch do.	10 0 0	9 10 0	9 0 0	9 10 0	9 10 0
6 inches and upwards, do.	9 10 0	9 0 0	8 17 6	9 0 0	9 0 0
Retorts, 1st fusion, hot blast	10 10 0	9 15 0	10 15 0	9 15 0	9 15 0
Do., 2nd do., cold do.	—	—	—	—	—
Tank Plates, ¼ thick and above	11 10 0	15 0 0	11 0 0	11 0 0	16 0 0

WROUGHT-IRON TUBES AND FITTINGS.

(Subject to 25 per cent. discount.)

Internal Diameter in Inches.	2	1½	1¼	1	¾	½
TUBES.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
Assorted, 2 to 14 feet, per foot	1 9	1 2	0 11	0 8	0 6	0 4½
Pieces, 12 to 23½ inches, each	3 0	2 0	1 8	1 4	1 0	0 9
Do., 3 to 11½ do.	2 3	1 4	1 1	0 11	0 8	0 6
Longscrews, 12 to 23½ do.	4 0	2 6	2 0	1 6	1 2	0 11
Do., 3 to 11½ do.	3 0	2 0	1 3	1 0	0 10	0 8
Bends and Lamp Bends	4 3	2 3	1 9	1 3	0 11	0 8
Springs, various elevations	3 3	1 8	1 4	0 11	0 9	0 7
FITTINGS.						
Square Elbows, equal or reducing	3 6	2 3	1 9	1 2	0 10	0 8
Round Elbows	3 10	2 6	1 11	1 4	1 0	0 9
Tees, equal or reducing	3 9	2 6	1 2	1 3	1 0	0 9
Crosses, do.	5 3	3 6	3 0	2 3	1 9	1 5
Sockets, reducing	1 3	0 11	0 9	0 7	0 6	0 5
Caps and Plugs	1 3	0 10	0 8	0 6	0 5	0 4
Nipples and Backnuts	1 0	0 8	0 6	0 4	0 3½	0 3
Sockets, plain	1 0	0 7	0 6	0 4	0 3½	0 3
Iron Main-Cocks	18 0	11 0	8 6	6 6	4 6	3 6
Syphon Boxes, 2 quarts	23 0	19 0	18 0	17 0	16 9	—

LONDON METAL MARKET.—*Per Ton.*

	£ s. d.		£ s. d.
Copper, tough cake	90 0 0	Tin, English block	121 0 0
Iron, Welsh bar	12 5 0	Tin-plates, best coke I. C.	1 16 0
Lead, English pig	23 10 0	Spelter, foreign	25 5 0

FREIGHTS.

COASTWISE.—*Per Ton.*

Newcastle—	s. d.	s. d.
Chatham and Rochester	—6	6
Cork (per keel)	£11	0 0
Dover, Folkestone, and Ramsgate (per keel)	—8	0
Dublin	£13 0	0—
Exeter Quay	£10 0	0—
Ipswich	—7	0
London (from wharf)	—7	0
London (Pool)	—7	3
Lowestoft and Yarmouth	—6	8
Portsmouth and Southampton	—8	6
Plymouth	—9	0
Shoreham	—7	6
Whitstable	—7	9
Weymouth	—7	6

FOREIGN.—*Per Keel.*

	£ s.	£ s.
Barcelona		—17 5
Bordeaux		—13 5
Boulogne and Calais		— 9 12
Cadiz		—12 0
Cronstadt		—10 10
Copenhagen		—11 0
Genoa		—18 5
Hamburg		—10 0
Havre de Grace		— 9 10
Leghorn		—18 10
Lisbon		— 9 10
Rotterdam		— 9 10
Stettin		— 9 10
Trieste		—22 0
Venice		—24 10

GAS COALS.—*Per Ton.*

Scotch Cannels, f.o.b.—	s. d.
Boghead, at Bo'ness	77 6
Capeldrae, at Burntisland	53 8
Cowdenbeath, do.	—
Donnibristle, do.	32 0
Kirkness, best, do.	53 8
Lesmahago (Auchin.), at Granton	46 0
Do. (Duke of Hamilton's), do.—	
Main	43 6
Wee	46 0
Do. (Nitshill Co.'s), do., and at Glasgow	47 6
Lochgelly, at Burntisland	—
Milton and Crosshill	33 8
Newcastle (Unscreened)—	
Haswells, Nettlesworth Primrose, and South Pelaw	
Felling, Framwell Gate, North Pelton, Walker's Primrose, West Wear, and Whitwell Primrose	
Burnhope, Charlaw, Derwent, East Castle, Edmondsley, Eighton Moor, Hartlepool Pelaw, Holmside, Lambton's Gas, Lanchester Pelaw, Medomsley, Mickley, New Pelaw, Pelaw Main, Pelton Main, Ravensworth, Seaham, South Moor Pelton, South Leverson, Townley Main, West Pelaw, Wearmouth Hutton, and Witton	
Pearetth, Ravensworth Pelaw, Waldridge, West Garesfield, and West Pelton	
Brancepeth, Dean's Primrose, Londonderry Gas, New Pelton, South Peareth, Urpeth, Washington, and West Leverson	
Ramsay's Newcastle Cannel	
Wigan Cannel, f.o.b. at Liverpool	

Scotch Cannels, f.o.b.—	s. d.
Armiston, at Leith	40 0
Billeyford, at Leith	26 0
Elphinstone Tower, do.	30 0
Grange Cannel, at Bridgeness	—
Haywood, at Granton	—
Kinniel, at Bo'ness	35 0
Lanemark, at Glasgow	—
Lochore, at Burntisland	53 8
Myles' do.	—
Pirnie, at Methill	26 6
Waverley Seam, at Burntisland	—
Old Wemyss Cannel, at Wemyss	45 0
Wemyss Rhumes Cannel	22 6
	Per Ton.
	—
	—
	—
	—
	—
	40 0
	40 0

CHEMICALS.

Ammonia—	£ s. d.	Iron Salts—	£ s. d.
Sulphate, white and grey	17 10 0	Green and rusty Copperas	3 5 0
Do., brown, 23 per cent.	15 15 0	Dry do.	2 15 0
Benzole, 30 per cent.	0 2 9	Sulphuric Acid	3 10 0
Carbolic acid	0 1 1		

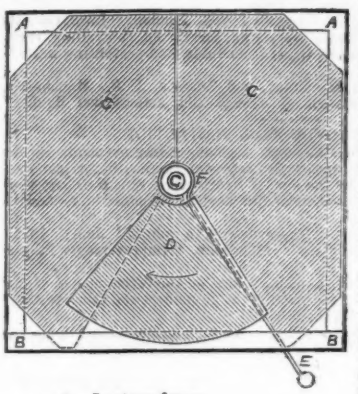
SUNDRIES.

	£ s. d.	£ s. d.
Best Newcastle Fire-bricks, per 1000	—	4 0 0
Do., Fire-clay Retorts, per foot run	0 7 0	— 0 7 6
Cliff's Fire-bricks, at Wortley, per 1000	—	3 10 0
Ingham's best Wortley Fire-bricks, on rail or boat, per 1000	—	3 10 0
Farnley Iron Co.'s Fire-bricks, do., do.	—	3 10 0
Wortley Fire-clay Retorts, per foot run	0 5 6	— 0 7 6
Tarred Rope Yarn, per cwt.	—	
Fraser's best Fire-bricks, f.o.b. at Inverkeithing	—	2 10 0
Do. Retorts, per foot run	0 5 0	— 0 7 6
Do. Ground Fire-clay, per ton	—	0 10 0
Stourbridge Fire-bricks, per 1000	—	3 0 0
Do. Fire-clay, per ton	—	0 12 0

Register of New Patents.

1487.—SKELTON, T. A., Essex Street, Strand, "*Improvements in street lanterns to facilitate lighting.*" Patent dated April 24, 1873.

The object in view in this invention is to provide improved means of opening and closing the bottoms of the ordinary square street lamps, so as to enable the lamps to be lighted without opening the side doors. This is done by forming the floor or bottom of the lantern of thick glass of sufficient strength to withstand the wear and use to which it will be subjected, and cut in shape and fixed so as to leave a sufficient space or opening to permit the lighting torch to enter, and to cover the opening or space so provided by a quadrant or segment of a circle, also of thick glass, of size sufficient to cover the opening and afford a bearing for itself upon the edges of the thick glass floor. The quadrant or segment of glass is set in a metal frame or bar having a loop round the central gas-pipe, which serves as a pivot, and a projecting arm extending outside the square frame of the lantern, so that the lamplighter may easily move the quadrant or segment from side to side by means of his torch rod, and so open or close the space for the lighting torch to enter. A metal bar is fixed to the lamp frame against the side of the opening, and flush or level with the glass floor, so that the outer edge of the sliding quadrant may have a bearing upon it while being moved.



A.—Lantern frame.
B.—Tin bar.
C.—Fixed glass.
D.—Sliding quadrant.
E.—Arm fixed to quadrant.
F.—Arm bent round gas-pipe.
G.—Gas-pipe.

1496.—PARLEY, W., Aylesbury, "*Improvements in producing gases, and in the construction and arrangement of the apparatus connected therewith, the whole of which improvements are applicable to the manufacture of gas for illumination, and part thereof may be applied for obtaining gas for heating purposes.*" Provisional protection only obtained. Dated April 25, 1873.

This invention consists in producing from coal or other substances holding hydrogen and carbon, or hydrogen and oxygen, or carbon and oxygen in combination, and subjecting these substances separately or together to a high temperature in suitable retorts and thereby effecting various chemical decompositions. The products are then brought into contact and thoroughly impregnated by hydrogen and oxygen generated by the decomposition of steam, and the whole of these gases are conveyed simultaneously into one or more retorts charged with coke or other substance containing hydrocarbon, and caused to pass over or through the material producing gas for illuminating or heating purposes in much greater quantity than heretofore.

1504.—WEST, J., Maidstone, Kent, "*Improvements in apparatus used in the purification of gas.*" Patent dated April 25, 1873.

This invention has reference to improvements in apparatus for distributing water or other liquid to scrubbers, and consists in raising water to the requisite height and allowing it to fall in a small stream into a vessel until it rises to such a height as to run over by an overflow-pipe into a second vessel placed below the first one. When sufficient liquid has been admitted, it causes a float to rise and open a valve or tip a tumbler, which causes a sudden influx of water to the lower vessel. The result is that an air-pipe is sealed, and the compression of air in the chamber starts a syphon, whereupon the liquid flows down its long leg and impinges upon vanes or blades attached to a hollow vessel like a bell or gasholder, thereby giving it, together with two or more curved arms, a rotary motion. The liquid runs off the bell into an annular tank and through pipes into a funnel and the curved arms pierced with holes, and as the liquid issues from the arms an additional impulse is given to them, thereby keeping up the motion until the upper part of the apparatus has repeated the action. A complete distribution of liquid is thus effected. The float or tumbler may be put in connexion with counting apparatus, whereby the quantity of liquid used may be registered.

1509.—SCOTT, H. Y. D., Ealing, Middlesex, "*Improvements in the treatment of sewage matters, and the deodorization of night soil.*" Patent dated April 25, 1873.

According to these improvements, instead of converting into charcoal as heretofore the solid matters deposited from sewage by precipitation with lime, or lime and clay, they are subject to a temperature only sufficiently high to decompose their organic matters, and so far scorch or only partially char them, so as to develop in them compounds of a tarry nature, but not completely to expel such compounds as is done in the preparation of charcoal. Sewage deposits thus treated, exercise a remarkable effect in destroying the noxious smell of putrescent compounds, and they may be used with great advantage in deodorizing night soil and rendering it innocuous.

1529.—LYON, H., and ROBINSON, E., Manchester, "*New or improved apparatus for indicating and giving warning of the contents of gasometers, and other similar receptacles, also useful for giving warning of the rise and fall of water in rivers, weirs, reservoirs, and other fluctuating collections of water.*" Provisional protection only obtained. Dated April 28, 1873.

The features of novelty in this invention consist in the application to the various purposes described of an apparatus which sonorously indicates the contents of any receptacle or the height of water in rivers, weirs, reservoirs, and other similar places, by means of a pendulum and bell actuated, in the case of a gasometer, by a projection; and, in the case of being applied to indicate the height of liquids, by means of a float which comes in contact with an arm projecting from the pendulum and suddenly releases it, so oscillating the pendulum and sounding the bell.

1533.—COLLS, F. W., Erith, Kent, "*Improvements in the manufacture of gas for heating and lighting purposes and in the apparatus employed therefor.*" Patent dated April 28, 1873.

This invention relates to a new and improved mode of manufacturing gas, in which apparatus specially contrived is employed so as to enable suitable gases to be combined and amalgamated with suitable hydrocarbons, or other oils or spirits, in order to produce therefrom, economically, a permanent gas of high illuminating and intense heating properties. The inventor has ascertained that by producing and heating carbonic acid, in the manner hereafter described, a very valuable and cheap permanent illuminating gas may be obtained, and having constructed two ranges or benches of retorts at some little distance from each other, so that a pipe, hereafter described, communicating between the two, can have a slight dip or depression of about one inch to each foot of its length. The retorts on the higher level are called the gas-retorts and those on the lower the carburetting retorts. But for the purpose of this description, it is proposed to deal with only one gas-retort, and one carburetting retort, and one pipe having the required dip communicating between the two. At a point in this pipe between the two retorts a junction or coupling is placed communicating direct with a vertical tube composed of suitable material, as glass or metal, provided with means whereby the height or quantity of oil or spirit in the interior of the vessel may be ascertained. The bottom of this junction tube nearest the gas-retort is provided with a slight projecting lip, which contracts the orifice or bore of the communicating pipe at a point immediately behind its junction with the vertical pipe, which leaves the full bore of the pipe open from the junction to the carburetting retort. The top of the vertical pipe is provided with a "union" or other means of attachment, by which one end of a serpentine pipe can be inserted and secured therein. The termination of this pipe in the vertical tube is considerably contracted so as to make its outlet or point of ejectment into the vertical tube of much less area than the diameter of the tube itself. The opposite end of the serpentine tube is connected with an enclosed chamber or supply-tank containing hydrocarbon or other oil or spirit. The tank is provided with gauges for indicating the temperature and quantity of spirit, and the pipes are supplied with the taps or cocks for regulating the flow of the liquids therefrom.

When carbonic acid is employed in the manufacture of permanent illuminating gas, the process is as follows:—In order to produce the carbonic acid, a quantity of chalk or carbonate of lime is placed in the closed gas-retort before mentioned, which, when heated, throws off carbonic acid gas. This gas as it is produced passes into a pipe communicating with the carburetting retort on the lower level, which is filled with incandescent carbonaceous matter heated by a furnace in the usual manner. The hydrocarbon spirit passing from its supply tank to the communicating pipe, through the medium of the serpentine pipe, simultaneously with the flow of the carbonic acid gas from the retort, causes the gas on passing the throttled or contracted portion of the pipe to become amalgamated with the hydrocarbon or other oil or spirit, the supply of which is maintained by the superior back pressure of the spirit in the serpentine tube at its point of ejectment into the vertical tube. From this pipe the carbonic acid gas and the spirit pass direct into the carburetting retort, the use of which is an important feature in the invention; its heat decomposes the hydrocarbon oil or spirit, and causes the carbonic acid, as it mixes with the heated incandescent carbonaceous matter, to be converted into carbonic oxide, the result of which is that the decomposed hydrocarbon and carbonic acid combine and become converted into gas of permanent properties, which is then passed through a main into a gasholder, and may be used as an illuminating or heating gas.

Although the above is a description of the manufacture and production of a permanent gas from carbonic acid gas and hydrocarbon or other oil or spirit, it will be obvious that in some cases, where it is more convenient or economical, hydrogen gas may be employed in place of carbonic acid gas, the carburetting retort being employed as in the former case. It will also be evident that any number of gas and carburetting retorts may be employed in combination, having an arrangement of serpentine and communicating pipes that will distribute the hydrocarbon or other oil or spirit to the carbonic or hydrogen gases uniformly during the passage of one or other to the carburetting retort.

1545.—CORT, J., St. Mary, Newington, "*Improvements in apparatus for drilling and tapping cast-iron main-pipes.*" Provisional protection only obtained. Dated April 29, 1873.

These improvements consist in so constructing the saddle of drilling apparatus which fits on to the main-pipe that a hollow boss is formed upon it, which is chased or screwed on the outside and fitted with a cap having an internal screw and arms or levers for turning it round; the drill and tap holder passes through the hollow boss on the saddle, and has a collar or shoulder on which the screw tap rests in order to give the requisite pressure when drilling or tapping, and is turned round by a ratchet brace. The drill and tap, for tapping the holes when drilled, are in one piece, the tap being a continuation of the drill, so that the tapping or screwing of the hole when drilled is done without removing the drill and replacing it by a separate tap, as is usually the case, thereby saving time and preventing any undue escape of gas or water, as the case may be, whilst attaching service-pipes to the mains.

By means of the hollow boss on the saddle and the screwed winged cap fitting thereon, for giving the requisite pressure to the drill and tap holder, the apparatus can be constructed in the most compact and portable form.

The saddle is attached to the main-pipes by means of a chain passing around it, and drawn tight by means of screws and nuts working through swivels, which are fitted on to the horns of the saddle; the chain may be also tightened by lengthening the arms of the swivels which rest on the saddle eccentrically and fitting them with forked levers.

1550.—CIOTTI, H., Palermo, Sicily, "*A new centrifugal and reacting pump.*

Provisional protection only obtained. Dated April 29, 1873.

This centrifugal and reacting pump consists in a vertical pipe or tube, at the upper end of which one or several other tubes are connected at any angle. When the lower end of the vertical tube is dipped into a liquid, a rapid rotary motion is imparted thereto, and to the system of connected tubes (the whole being first primed), the result being that the liquid ascends into the first, second, or any other tubes connected with the vertical one, and is discharged therefrom. When the vertical tube is very long, instead of imparting a rotary motion to the whole of it, the upper part only may be put in motion, together with its horizontal delivery tubes.

1552.—NOLDEN., M., Frankfort-on-the-Main, "*An improved method of and apparatus for cleansing water from impurities.*" Patent dated April 29, 1873.

This invention relates to apparatus for cleansing water, more particularly the feed water of boilers. The water flows slowly into a tank enclosed within an upper compartment of the apparatus supplied with waste or other steam, and in this tank it is heated and precipitates part of its impurities. In overflowing, it drives a water-wheel, and then flows into one end of a lower compartment provided with vertical diaphragms by which it is made to flow in a zigzag course to the other end, whence it is discharged. The water-wheel works one or more archimedean spirals which introduce chemical solutions into the lower compartment for completing the precipitation of impurities therein. Such solutions may also be introduced by pumps or from reservoirs. The water cooled by radiation in the lower compartment may be reheated by steam from the upper compartment admitted to play on it at the discharge aperture.

1575.—DUFFEE, E., Haverhill, Massachusetts, U.S.A., "*Improvements in screens for coal gas purifiers.*" Patent dated May 1, 1873.

The object of this invention is to provide a screen more simple in construction and more durable than those heretofore employed for a like purpose, and consists—First, in dispensing with the thin strips of wood or ratan woven across the frame of the screen or interlaced in the form of basketwork, and using in place thereof a series of independent cylindrical or other proped-shaped rods or bars extending through holes in the frame, either longitudinally or transversely, as may be desirable, the rods or bars being arranged at a suitable distance apart to support the lime and leave spaces between them for the passage of the gas. Second, in forming the sides of the frame with inclined or bevelled edges, in order that when the screens are disposed in the box wedged-shaped openings shall be formed between them to receive a large body of lime, and

thus better to lute or cover the openings than if the sides of the frame were unprovided with such reductions, and thereby ensure a more perfect purification of the gas.

1579.—DAVIS, P. J., Hornsey, Middlesex. "*Improvements in apparatus for controlling, regulating, measuring, and arresting the flow or discharge of fluids or liquids, and preventing waste thereof.*" Patent dated May 2, 1873.

This invention consists in certain novel arrangements and combinations of syphons, air-tubes, service-boxes, air-cups, pumps, &c., in connexion with the cisterns, supply overflow, or soil-pipes of water-closets, urinals, or other points of delivery, so contrived as to act as waste-preventers without the employment of any close-fitting valves whatever. Also in certain improved arrangements of fixed and moveable valve-seatings, appropriate valves, and retarding mechanism, combined or not, with parts of the first described apparatus, but so adapted as to act as waste-preventers. Also in the employment, as a means of preventing waste, of a retarding apparatus connected with the outlet-valves of cisterns, consisting of a cylinder or axis furnished with blades or paddles revolving inside a box containing a fluid which offers resistance to the motion of the blades so as to allow the outlet-valve to close gradually. Also in a novel arrangement and adaptation of a float and valve to act as a "ball-valve" against any head of water by causing the pressure of the head of water to act on a piston or plunger connected to and forcing the valve as it closes tightly against its seat. And also in certain improvements in what are known as "water frugals" (see Patent No. 1716, July 3, 1871), which consist, firstly, in combining the "retarding-valve" with the "carrier," instead of their being separate; and, secondly, in applying to the shut-off valve a tapered stem, or one in which a tapered notch is formed, the stem entering the outlet passage, the area of the latter for the flow of water is gradually contracted as the valve closes, and tremor or fluttering is thereby obviated.

1611.—WIRTH, F., Frankfort-on-the-Maine, "*Improvements in self-lighting gas apparatus.*" A communication. Provisional protection only obtained. Dated May 5, 1872.

The chief features of novelty in this invention are—1. The maintaining of a minute flame in an auxiliary burner, from which the illuminating burner is ignited. This is done by means of a flexible or moveable diaphragm actuated by the pressure of the gas supply for automatically opening and closing the cocks of the burner or burners. 2. The means of regulating the supply of gas to the auxiliary and main burners. 3. The mode of pivoting and securing the plug of the stop-cock in place. 4. The employment of a peculiar burner to perform the office of the auxiliary burner.

1614.—CHARLES, P., Stoke Newington, Middlesex, "*Improvements in apparatus for supplying water to water-closets, and for the prevention of waste of water admitted thereto.*" Provisional protection only obtained. Dated May 5, 1873.

This invention relates to the construction and application of apparatus consisting of a cistern divided by partitions into one large and two small compartments or chambers. From the large or supply chamber there are two conduits fitted with spindle-valves, and to the small chambers are attached two outlet-pipes also fitted with spindle-valves. Across the top of the cistern is a shaft carrying arms, the extremities of which are connected to the valves. Water is admitted to the supply-chamber, and to one of the smaller compartments, until it reaches a certain height, when the further supply of water is shut off by a ball-valve. When the closet is to be flushed, a cord, chain, or lever is pulled, which, operating upon the shaft, shuts the inlet-valve and opens the outlet, thereby permitting the proper quantity to flow to the pan. Simultaneously with this action, water is admitted to the other smaller chamber, and on the cord being released, the inlet to this chamber is shut, and the outlet opened, thus permitting water to flow to the pan in suitable quantity to fit it for future use.

1633.—ALLEY, S., Glasgow, "*Improvements in arranging retorts, and in apparatus for charging and drawing the same.*" Provisional protection only obtained. Dated May 6, 1873.

This invention consists in constructing the retort-benches or buildings containing the retorts in a circular form, with the retorts radiating from a centre, and by preference horizontally, whilst there is placed in the centre elevating and turning apparatus with tools and appliances for charging the fresh coal or other material into, and for withdrawing the residues from, one or more of the retorts at a time.

APPLICATIONS FOR LETTERS PATENT.

206.—BALL, C. J., Blackfriars, London, "Improvements in the manufacture of drills for boring holes." Jan. 16, 1874.

207.—HUERNE, P., San Francisco, California, "An improved self-cleaning water-filter and connexions, whereby water may be filtered for household purposes, and stored in quantity so as to be used at pleasure." Jan. 16, 1874.

219.—GRIFFIN, J. T., Upper Thames Street, London, "Improvements in the construction of wrenches for turning pipes, bars, and other similar articles." A communication. Jan. 16, 1874.

226.—LAMONT, J., Glasgow, "Improvements in water-closets and in service-cisterns for these and other purposes." Jan. 17, 1874.

231.—FORBES, Rev. G. H., Broughton Rectory, Northampton, "Improvements in the purification of gas and the manufacture of artificial fuel." Jan. 17, 1874.

232.—FORBES, Rev. G. H., Broughton Rectory, Northampton, "Improvements in the purification of gas." Jan. 17, 1874.

239.—BROADFOOT, J., Glasgow, "Improvements in pumps." Jan. 19, 1874.

242.—GEDGE, W. E., Wellington Street, Strand, London, "Improvements in gas-burners with lateral and covered jets." A communication. Jan. 19, 1874.

246.—VAUGHAN, E. P. H., Chancery Lane, London, "Improvements in apparatus for generating inflammable gas by the carburization of atmospheric air." A communication. Jan. 19, 1874.

251.—ABRAHAMS, A., St. Peter's Park, Middlesex, "Improvements applicable to gas and other lamps." Jan. 20, 1874.

254.—SYNGE, M. H., Pall Mall, "Improved apparatus for deodorising and discharging fluids, and for trapping sinks, drain-pipes, and tanks." Jan. 20, 1874.

255.—SYNGE, M. H., Pall Mall, "Improved apparatus for filtering and purifying the dramage of houses and streets." Jan. 20, 1874.

261.—LAKE, W. R., Southampton Buildings, London, "Improvements in lamps." A communication. Jan. 21, 1874.

277.—TYLOR, A., and TYLOR, J. J., Newgate Street, London, "Improvements in apparatus and arrangements for containing, measuring, controlling, regulating, and arresting the supply of liquids and fluids, and preventing waste." Jan. 22, 1874.

283.—SCOTT, H. Y. D., Ealing, Middlesex, and SPENCE, J. B., Manchester, "Improvements in the treatment of sewage and ammoniacal liquids." Jan. 22, 1874.

GRANTS OF PROVISIONAL PROTECTION.

64.—BENSON, M., Southampton Buildings, London, "Improvements in the structure of furnaces and the apparatus connected therewith for manufacturing iron and other metals by the use of hydrocarbon vapour or gas, combined with or without superheated steam for heating purposes." A communication. Jan. 6, 1874.

84.—BROOKES, W. H., Birkenhead, "Improvements in pumps." Jan. 7, 1874.

112.—FARQUHAR, J. F. C., Long Acre, Middlesex, "Improvements in gas-burners." Jan. 8, 1874.

138.—JENSEN, P., Chancery Lane, London, "New or improved modes of and means and materials for the manufacture of gasholders and other vessels." A communication. Jan. 10, 1874.

168.—ABEL, C. D., Southampton Buildings, London, "Improvements in electric tell-tales for pressure-gauges." A communication. Jan. 13, 1874.

INVENTIONS PROTECTED FOR SIX MONTHS ON THE DEPOSIT OF COMPLETE SPECIFICATIONS.

203.—HOOKER, W. D., San Francisco, California, "Improvements in direct-acting steam-engines, also including improvements in pumps." Jan. 15, 1874.

207.—HUERNE, P., San Francisco, California, "An improved self-cleaning water-filter and connexions, whereby water may be filtered for household purposes and stored in quantity so as to be used at pleasure." Jan. 16, 1874.

NOTICES TO PROCEED.

3110.—FORBES, Rev. G. H., Broughton Rectory, Northampton, "Improvements in the manufacture of compounds to be used as fuel." Sept. 23, 1873.

4264.—DEACON, G. F., Liverpool, "Improvements in apparatus for indicating the velocity or measuring the flow of water in pipes." Dec. 29, 1873.

28.—FORBES, Rev. G. H., Broughton, Northampton, "A new or improved compound to be used as fuel." Jan. 2, 1874.

34.—FORBES, Rev. G. H., Broughton, Northampton, "Improvements in compounds designed for the manufacture of cements, plaster, or artificial stone, capable also of being used for artificial fuel." Jan. 2, 1874.

70.—CLARK, A. M., Chancery Lane, London, "Improved apparatus for regulating the pressure and friction of fluids." A communication. Jan. 6, 1874.

PATENTS WHICH HAVE PASSED THE GREAT SEAL.

2214.—ROSS, O. C. D., Craven Street, Strand, "Improvements in the production of vaporized air for heating purposes generally, and in means for regulating and controlling the admixture of vaporized and other air when employed for such purposes." June 25, 1873.

2534.—ROBEY, J., Manchester, "Improvements in treating sewage and other foul liquids." July 25, 1873.

2543.—HEDLEY, T. A., Abchurch Lane, London, "Improvements in the manufacture, combination, and purification of gases for lighting and heating purposes, and in the apparatus employed therein." July 25, 1873.

2603.—SPICE, R. P., Parliament Street, Westminster, and HARTLEY, F. W., Stockwell, Surrey, "Improvements in carburetters." Aug. 1, 1873.

2680.—CAREY, R., Brixton, Surrey, "Improvements in steam-engines and pumps." Aug. 12, 1873.

2781.—WARREN, W., Cheltenham, "Improvements in and applicable to pumps." Aug. 22, 1873.

2812.—LAKE, W. R., Southampton Buildings, London, "An improved machine for forming the internal screw-threads of gas-fittings." A communication. Aug. 26, 1873.

3017.—WALKER, W., Manchester, "Improvements in apparatus for regulating and controlling the temperature of liquids and fluids." Sept. 15, 1873.

3162.—FORBES, J., and HAMILTON, J., Handsworth, near Birmingham, "An improved rotary engine and pump, to be driven by water or steam power." Sept. 29, 1873.

3205.—FORBES, Rev. G. H., Broughton, Northampton, "Improvements in compounds designed to be used as fuel or for the manufacture of lime, cement, plaster, and artificial stone." Oct. 3, 1873.

PATENTS WHICH HAVE BECOME VOID

BY REASON OF THE NON-PAYMENT OF THE ADDITIONAL STAMP DUTY OF £50 BEFORE THE EXPIRATION OF THE THIRD YEAR.

60.—ADIE, P., "Improvements in lamps." Jan. 10, 1871.

67.—NORMAN, J., "Improvements in apparatus to be used in the manufacture of tubes." Jan. 11, 1871.

W. T. ALLEN & CO.,

(LATE TURNER & ALLEN,)

201, UPPER THAMES STREET,

London,

GAS & WATER ENGINEERS.

CONTRACTORS FOR THE SUPPLY OF

LAMP COLUMNS, LANTERNS,

FOUNTAINS, PIPES, &c.,

TO

GAS, WATER, & RAILWAY COMPANIES, LOCAL BOARDS, SHIPPERS, &c.

A Volume of the Newest Designs, with Price Book, forwarded on receipt of 10s.

GAS COAL

AND

HOUSE COAL.

For prices, including Waggon Hire and Railway Rate to any Station or Shipping Port, apply to

MR. PLEVINS,

MONKWOOD COLLIERIES,

NEAR

CHESTERFIELD.

NOTE.—Quotations given for the small, which for Gas and Coke results is equal to the large.

The GRAND MEDAL of MERIT at the VIENNA EXHIBITION has been AWARDED to

GWYNNE & BEALE'S PATENT IMPROVED GAS-EXHAUSTERS,

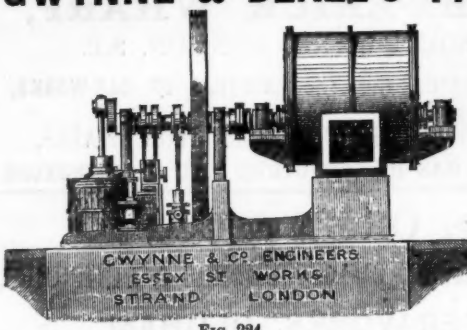


FIG. 224.

The BEST EXHAUSTERS IN THE WORLD.
Made under the personal superintendence of
Mr. BEALE,
The oldest Maker, Inventor and Patentee of
GAS-EXHAUSTING MACHINERY.
(It is NOT CORRECT to state that Mr. BEALE has RETIRED.)

Prices and every information on application.

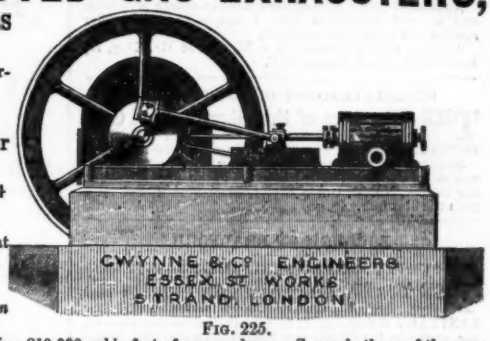


FIG. 225.

Fig. 224 represents one of those erected at the Imperial Gas-Works, Bromley, capable of passing 210,000 cubic feet of gas per hour. Several others of the same size are now on order for the same Company. These Patent Machines combine the highest quality of workmanship and materials, the largest bearings and wearing surfaces, with the most perfect system of action yet discovered. Fig. 225 represents one of a series of four at the Nottingham Gas-Works, each passing 62,500 cubic feet per hour. GWYNNE AND CO. *do not pretend to enter into a struggle with other makers in respect to cheapness. They have never sought to make price the chief consideration, but to produce Machinery of the very highest quality, and the most approved design and arrangement.* Their prices have been estimated with a due regard to the excellence of the article produced, and when this is taken into consideration, they have no fear for the result. The orders executed this season for Exhausters and alterations to their patented system amount to over 4,000,000 cubic feet of gas passed per hour, and to over 300 horse power for Engines to drive them. In every instance their work is giving the greatest satisfaction. Numerous testimonials and references can be given.

REGULATORS, BYE-PASSES, STOP-VALVES, GAS-VALVES, & MACHINERY FOR GAS MANUFACTURE, OF ALL SIZES, CAN BE HAD ON APPLICATION TO

GWYNNE & CO., HYDRAULIC & GAS ENGINEERS, ESSEX STREET WORKS, STRAND, LONDON, W.C.

G. & Co. are now manufacturing for a London Gas Company three of their 210,000 cubic feet Patent Gas Exhausters, and many of all sizes.

DUKE OF HAMILTON'S
LESMAHAGOW GAS COAL.

The superior quality of this well-known Cannel, as wrought by

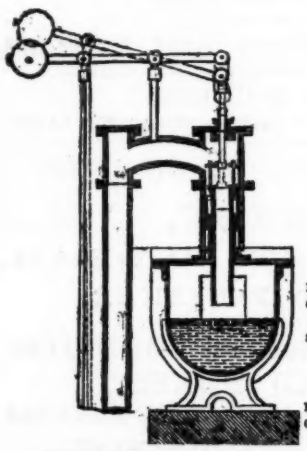
THE NITSHILL AND LESMAHAGOW COAL COMPANY,

Is now generally admitted by all Gas Engineers.

PRICE AND ANALYSIS MAY BE HAD ON APPLICATION TO

JAMES M'KELVIE, HAYMARKET, EDINBURGH.

CHANDLER'S PATENT DIP-PIPE.



The advantages are—

1st, There is no pressure on the Retorts.
2nd, No deposit of Carbon.
3rd, No scurfing required.
4th, Never a choked Ascension-Pipe.
5th, Saves Fuel and Wear and Tear.
6th, Gets 10 per cent. more Gas out of the Coal, and a higher
7th, Is never out of order. [Illuminating Power.

The following Testimonials have been received:—

Engineer's Office, Metropolitan District Asylum Gas-Works, Caterham, Surrey.

Messrs. Chandler and Sons.

Dear Sirs,—In reply to your inquiries, I beg to inform you that since I have used your Patented Dips (ten in number), I find my make has increased over 1000 cubic feet per ton of coal carbonized, my usual make being 9070 cubic feet before using your Dips, and 10,150 cubic feet since using them.

I should add that I intend recommending the committee to adopt them throughout these works. I also find that since these Dip-Pipes have been fitted, I have had no ascension-pipes choked, which was before a great nuisance.

Jan. 15, 1874. Yours truly, WM. CRICKMAY.

Manager's Office, Gas-Works, Buxton.

Messrs. Chandler and Sons.

Gentlemen,—I am so satisfied with the working of your Patent Dips during the last five months that I have resolved to recommend the adoption of them in our proposed extensions. I find it under perfect control to work with or without seal at pleasure, and that during the whole time there has been no deposit of carbon.—Yours, &c.,

Jan. 21, 1874. GEO. SMEDLEY.

Messrs. Chandler and Sons.

Gentlemen,—I beg to inform you that during last week I carbonized 18 tons 5 cwt. of Ravensworth Pelaw coal in a single setting of retorts fitted with your Patent Dip-Pipes, and obtained a yield of 195,800 feet of gas, equal to 10,730 feet per ton, which is a considerably greater yield than I have been able to obtain before using your Dip. The single retort fitted with your Patent Dip, which has now been in use here upwards of four months, has been throughout, and is now, quite free from carbon.

I am, gentlemen, &c.,

Erith Gas-Works, Aug. 2, 1873. (Signed) D. VINCENT, Manager.

For terms of use and cost, apply only to the Patentees,

Messrs. CHANDLER & SONS, ENGINEERS & CONTRACTORS, YORK ST., LONDON ROAD, SOUTHWARK, LONDON, S.E.

WANTED, by the Advertiser, a situation as Gas Manager or Manager and Secretary. Capable of carrying out all plans in the erection and extension, manufacture, distribution, mains, services, fittings, &c.
Address G. G., care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, for the country, a good GAS-FITTER and SMITH, one that can drive a steam launch preferred. Wages 27s. per week. Constant employment. Must have good references.
Address C. R., care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

TO GAS ENGINEERS AND MANAGERS.

WANTED, by a young man, aged 20, son of a Gas Manager, a situation as ASSISTANT MANAGER, or in any capacity where he can be useful in a Gas-Work, or in erection of works. Is a good draughtsman. Good references. No objection to go abroad.
Address T. M., 64, Bankside, Southwark, LONDON.

WANTED, a Foreman Stoker, for a Gas-Work within 20 miles of Birmingham. Wages 30s. per week, with house, coals, and gas.
Apply to Mr. PROUD, 103, Icknield Street East, BIRMINGHAM.

WANTED, a small test Gasholder for 2½ ft. or 5 ft., with connexions complete.
State price to B. W., 4, Finsbury Road, Lodge Street, LEEDS.

COOKING AND HEATING BY GAS,
BY
MAGNUS OHREN, A.I.C.E.

GAS *versus* COAL.

Pamphlet for Gas Companies to circulate amongst their gas consumers to increase day consumption, &c.
Specimen Copy by post 4d., direct from MAGNUS OHREN, Gas-Works Lower Sydenham, London, S.E.

WANTED to purchase, 5000 to 10,000 tons of GAS COKE. Waggons can be sent to any station for any proportion of above.
Address G. J. EVESON, Gas Coal and Coke Merchant, STOURBRIDGE.

GAS-WORKS ON LEASE WANTED.

OWNERS of Gas-Works desirous of letting them on LEASE are requested to send full particulars to E. R., 110, Strand, LONDON.

VINCENT AND CO.'S
PATENT IMPROVEMENTS IN
Apparatus for Manufacturing Gas.
Particulars to be obtained by application to—
MR. LAYARD JONES,
ENGINEER,
25, OLD BROAD STREET, LONDON, E.C.

GAS MANAGER Wanted immediately for small works on the West Coast of South America. Place very healthy. Actual make less than 10 million per annum. Salary £360 per annum, with house, gas, and water.

Applicants must already have been in charge of works, and be well acquainted with retort-setting and other routine of a small establishment.

Address, with references, to A. X., care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

SUPERINTENDENT OF GAS-FITTINGS.

THE Directors of the Birmingham Gas-light and Coke Company require a competent SUPERINTENDENT for their fittings department.

Applications by letter only, stating age, qualifications, and salary expected, to be addressed to the SECRETARY, at the Offices, No. 28, Union Street, BIRMINGHAM, not later than the 31st inst.

BOROUGH OF BRADFORD.

TO SURVEYORS AND SANITARY ENGINEERS.

THE Bradford Corporation require the services of a thoroughly competent SURVEYOR and SANITARY ENGINEER, to take the entire charge of all the works in the Street and Drainage Department of the Borough. He will be required to attend exclusively to the duties of his office, and will be under the control and subject to the instructions of the Street and Drainage Committee. Salary £400 per annum.

Any further information required may be obtained on application at the undernamed office.

Applications, accompanied by testimonials, and stating the candidate's age, must be delivered, sealed, at the undernamed office, on or before the 7th day of February next, endorsed "Application for Surveyorship."

By order,
W. T. M'GOWEN Town-Clerk.

Town-Clerk's Office, Town Hall, Bradford,
Jan. 17, 1874.

FOR SALE.

THE Reading Gas Company invite TENDERS for the purchase of Two 6-horse power Cornish BOILERS, with fittings complete, and a 5-horse power VERTICAL ENGINE. Also for an 8-in. STATION GOVERNOR, by Wright, with bye-pass and three valves; each are in good condition, and can be delivered on to the rails immediately.

Tenders to be delivered at my Office, on or before the 9th of February next, marked "Tender for Boilers, Engine, or Governor" (as the case may be); and, in the meantime, particulars may be obtained, or the articles inspected, by application to the undersigned.

The Directors will not bind themselves to accept the highest or any tender.

EDWARD BAKER, Engineer.

Reading Gas Company,
Engineer's Office, King's Road Station,
Jan. 17, 1874.

TO IRONFOUNDERS & CONTRACTORS.

THE Directors of the Exeter Gaslight and Coke Company are prepared to receive TENDERS for the supply of about 700 yards of 15-in., 440 yards 12-in., 989 yards of 7-in., and 200 yards 4-in. Cast-Iron SOCKET-PIPES, with such syphons, tees, and bends as may be required.

The tenders to state the price per ton at which the pipes will be delivered at Exeter, and the weight of each description of pipe per length of 9 ft. 4½ in.

The Directors will require a guarantee that each pipe has been proved with a pressure of water equal to 300 ft. in height, the pipe being struck with a 4-lb. hammer whilst being proved.

Specifications may be had on application.

The whole to be delivered free from all imperfections at Exeter on or before the 30th of April next, and sealed tenders to be sent to me, the undersigned, on or before the 16th day of February next, endorsed "Tenders for Mains."

The Directors do not bind themselves to accept the lowest or any tender. By order,
W. A. PADFIELD, Secretary.

Gas Offices, Exe Island, Exeter,
Jan. 21, 1874.

THE Scarborough Gas Company, owing to the removal of their works, will have FOR SALE, about October, 1874, the following APPARATUS, the whole of which is in exceedingly good condition:—

Fittings for 140 Retorts, consisting of mouthpieces, ascension, saddle, and dip pipes, and hydraulic and foul mains.

A Condenser, consisting of 40 12-in. pipes, with top and bottom boxes, and inlet, outlet, and bye-pass valves.

Two Scrubbers, each 7 ft. diameter and 16 ft. high, with valves as before.

Two Purifiers, 8 ft. 6 in. square and 5 ft. deep, 20-in. water lutes.

Two Cast-iron Water-Tanks, respectively 24 ft. by 16 ft. by 4 ft., and 20 ft. by 8 ft. by 4 ft. New in 1865.

Two Horizontal Engines, 4 h. p., two single-flue Cornish boilers, and two 20,000 feet per hour Beale's Exhausters. All new in 1866.

One Station-Meter, by Milne, 0,000 feet per hour. New in 1864.

One Gasholder 80 ft. diameter, in two 24-ft. lifts. About 11 years old.

One Gasholder 50 ft. diameter, in two 22-ft. lifts. Only 4 years old.

Two Governors, by Parkinson, on 12-in. and 10-in. mains.

A considerable length of 10-in. Cast-iron Socket and other Pipes.

An inspection of the above Apparatus is requested by the Officers of Companies requiring enlargements or extensions, and offers to purchase will be duly considered.

By order of the Board,
JAMES MOON,
Manager and Secretary to the Company.

BRONNER'S PATENT GAS-BURNERS give 99 per cent. of light, as compared with 27 per cent. given by ordinary burners, with equal consumption of gas.—*Vide* "Gas Referees Report," published June, 1869.

HENRY GREENE AND SON, Sole Consignees of Brönner's Patent Improvements in Gas Lighting, 16 and 17, King William Street, LONDON, E.C.

ALFRED WILLIAMS,

PHŒNIX FIRE-BRICK WHARF,

64, BANKSIDE, SOUTHWARK, LONDON, S.E.

GAS ENGINEER AND CONTRACTOR FOR THE ERECTION OF GAS-WORKS,
AND FOR THE
SUPPLY OF RETORTS, FIRE-BRICKS, CAST-IRON MAINS,
AND ALL MATERIALS FOR GAS MANUFACTURE AND DISTRIBUTION.

GEORGE ORME & CO.,

GAS-METER MANUFACTURERS, BRASSFOUNDERS & FINISHERS,

ATLAS METER-WORKS, OLDHAM.

CONSUMERS WET & DRY GAS-METERS ON THE MOST APPROVED PRINCIPLES.

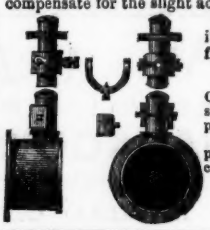
STATION-METERS, GOVERNORS, PRESSURE-REGISTERS,

And every Description of Gas Apparatus.

GAS, STEAM, AND WATER FITTINGS.

BOX'S PATENT ASCENSION-PIPES.

By the adoption of the improved ascensions and joints the trouble and annoyance of "jumping" stopped pipes is entirely obviated, while the time and labour saved will in a very short time amply compensate for the slight additional expense entailed in fitting them to existing apparatus.



In support of his own experience as to the advantages to be derived from the invention, the patentee has the pleasure to submit the following testimonial from the Engineer of the Phœnix Gas Company:—

Phœnix Gaslight Company, Bankside, S.E., Engineer's Office, Dec. 19, 1873.

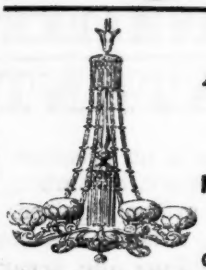
DEAR SIR,—I have fitted about 20 ascension-pipes at the Vauxhall Station of this Company with your patent joints, I am thereby enabled to remove the pipe when it is stopped and substitute a clean one in about ten minutes, cleaning out the obstructed pipe at leisure.

Until the happy time arrives when we can remove the necessity for "jumping" pipes at all, your joints will afford considerable relief. I trust your neat and ingenious contrivance will meet with the success it deserves. Yours faithfully,

Mr. W. Box, Crayford Gas-Works. C. WOODALL.

For terms and further information, apply to

W. BOX, GAS-WORKS, CRAYFORD, KENT.



F. & C. OSLER,

45, OXFORD STREET, LONDON, W.

MANUFACTORY AND SHOW-ROOMS:

BROAD STREET. BIRMINGHAM.

ESTABLISHED 1807.

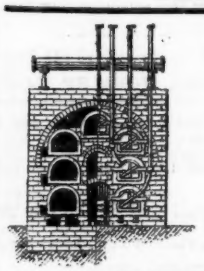
MANUFACTURERS OF CRYSTAL GLASS CHANDELIERS,
WALL LIGHTS, AND LUSTRES FOR GAS AND CANDLES.
TABLE GLASS OF ALL KINDS.
CHANDELIERS IN BRONZE AND ORMOLU. MODERATOR LAMPS.

TO GAS COMPANIES, ENGINEERS, CONTRACTORS, AND OTHERS.

GEORGE NEWTON,

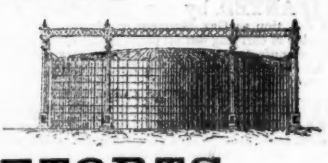
UNION STREET WEST, OLDHAM,

BRASS FOUNDER AND FINISHER,
MANUFACTURER OF
IMPROVED WET AND DRY CONSUMERS GAS-METERS,
LAMP METERS AND BOXES,
GOVERNORS, GAUGES, INDICATORS, EXHAUST & PRESSURE REGISTERS,
GAS STATION-METERS,
With all the joints planed.
TERMS, &c., ON APPLICATION.



HENRY SKOINES,

PATENTEE
AND
CONTRACTING
GAS
ENGINEER,
FOR



SETTING RETORTS,

ERECTING AND REMODELLING GAS-WORKS

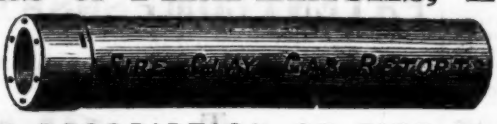
Of any extent, at Home or Abroad,

Address, 7, ARGYLE STREET, KING'S CROSS, LONDON, W.C.

JOHN HALL & CO.

STOURBRIDGE,

MANUFACTURERS of FIRE-BRICKS, LUMPS, & TILES,



AND EVERY DESCRIPTION OF FIRE-CLAY GOODS.

N.B.—A Stock of 15 and 18 in. CIRCULAR RETORTS always on hand. Other kinds made to order on short Notice.

THE STEAM STOKER COMPANY, LIMITED,

ARE NOW PREPARED TO GRANT

LICENCES FOR THE USE OF THEIR VARIOUS PATENTS

FOR

STOKING BY MACHINERY.

UNDER one or the other of their Patents, Machines can be adapted to almost any existing works without material alteration of the Retort-Houses or Settings.

Applications, accompanied by full particulars as to dimensions of the Retort-Houses, Settings of the Retorts, &c., &c., should be addressed to the Secretary, at the Offices of the Company,

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HODGE & CO.'S

IMPROVED VENTILATING SUN-LIGHTS

WITH TALC REFLECTORS AND SELF-ACTING VALVES

TO PREVENT DOWN-DRAUGHT;

VENTILATING GLOBE LIGHTS for DINING-ROOMS, LIBRARIES, &c.

Ormolu, Bronze, & Crystal Gaseliers;

MEDIÆVAL CHURCH WORK AND CORONÆ

COCKS, VALVES, and FITTINGS for GAS, STEAM, and WATER;

COLUMNS, BRACKETS, & STREET LANTERNS;

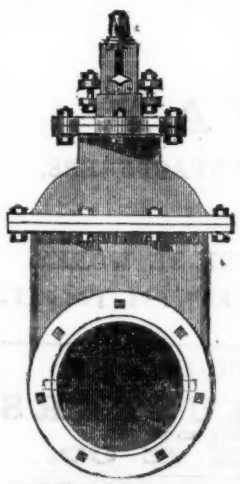
BLACK AND GALVANIZED BARREL COMPO AND TIN PIPE.

GAS ENGINEERS,

100, HATTON GARDEN, LONDON.

Drawings and Prices upon application.

C. & W. WALKERS' DOUBLE-FACED GAS-VALVES.



These solidly constructed double-faced Gas-Valves are superseding the old system of the light, single-faced disc, which is too uncertain and unreliable in large bores.

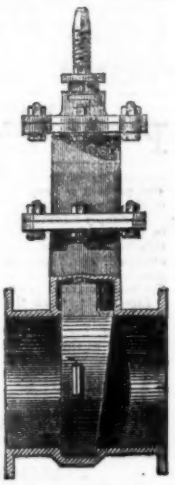
They are guaranteed absolutely gas-tight. They are very massive and rigid, and by improved modes of manufacture they are produced at very little excess in cost over the old light, weak system, which is liable to spring and bend, and become leaky.

The Valve is a rigid wedge of solid cast iron, having two perfectly scraped surfaced facings fitting between the two on the body, which are also surfaced.

A spring in two short halves, and, therefore, not liable to break, is used only for scraping the front facing clean.

The front facing is vertical; the back facing forms the wedge.

At a slight additional expense both flanges are faced to bolt to main-pipes.



GASHOLDERS, TELESCOPE & SINGLE-LIFT, of LARGEST DIMENSIONS.

PURIFIERS, SCRUBBERS, CONDENSERS of most Improved Description.

WOOD SIEVES FOR PURIFIERS,

Which have now been in use for more than ten years, and their advantages and durability fully established. They are made entirely by steam machinery in very large quantities at the most moderate cost.

MIDLAND IRON-WORKS, DONNINGTON, near NEWPORT, SHROPSHIRE; 8, FINSBURY CIRCUS, LONDON.

TO IRONWORKERS, CONTRACTORS, & BUILDERS.

THE Abergavenny Improvement Commissioners invite TENDERS for the construction of a Single-lift GASHOLDER, 80 ft. diameter by 20 ft. deep, at Abergavenny Gas-Works. Parties tendering are to furnish their own plans and specification free of charge, but these will be returned if the tender be not accepted.

Tenders are also requested for the construction of a Stone and Brick TANK at the said Gas-Works, to contain the aforesaid gasholder. Plans and specification of the tank are prepared, and may be seen on application to the Manager.

Any information required may be obtained of Mr. Cross, the Manager, at the Gas-Works.

Tenders to be sent and delivered to the Clerk to the Commissioners, Town Hall, Abergavenny, not later than Thursday, Feb. 5, 1874.

The Commissioners do not bind themselves to accept the lowest or any tender.

J. T. RUTHERFORD, Clerk,
Abergavenny Improvement Commissioners.

Jan. 17, 1874.

MR. WILLIAM DORE (19 years Gas Engineer and Accountant) may be CONSULTED upon all matters relating to the manufacture and distribution of gas, and the management, accounts, or transfer of gas undertakings.

Office, 4, Picton Place, Neath, SOUTH WALES.

Mr. ALFRED LASS,

60, CORNHILL, LONDON, E.C.,

Is prepared to open the Books, and, if necessary, keep the Accounts of Gas and Water Companies.

To examine the Books and Accounts, and prepare Balance-Sheets for the information of Directors.

To assist Secretaries in preparing Balance-Sheets, according to the "Gas-Works Clauses Act, 1871;" or may be consulted with respect to Accounts generally.

TO INVENTORS AND PATENTEES.

MR. W. H. BENNETT, having had considerable experience in matters connected with Gas, Water, and Sanitary Improvement, begs to say that he continues to assist Inventors in the perfection of their designs, and to obtain for them PROVISIONAL PROTECTION, whereby their invention may be secured for Six Months; or LETTERS PATENT, which are granted for Fourteen Years.

Patents completed, or proceeded with at any stage, thereby rendering it unnecessary for persons resident in the country to visit London.

Patents procured for Foreign Countries.

Information as to cost, &c., supplied gratuitously upon application to the Advertiser, 42, Parliament Street, WESTMINSTER.

COST PRICE SHEETS.

MANUFACTURE AND DISTRIBUTION OF GAS. These sheets are the same as were laid before the Dublin Meeting of the British Association of Gas Managers; but in the REPRINT, NOTES have been added for the guidance of those using them. Copies of the two sheets may now be had, price 5s.

South Shields. W. J. WARNER.

BAILEY'S Patented Inventions are now in extensive use wherever steam is known. Bailey's Patent Steam Gauges, Pyrometers, Water Gauge Cocks, Test Pumps, Fusible Plugs, Steam and Water Valves, Safety Valves, Junction Valves, Pumps, Tell-Tales, Recorders, Lightning Conductors, Electric Telegraphs, Turret Clocks, Steam Joint Cement, Lifting Jacks, Boiler Feeders, Lime Catcher and Separator, Injectors and Ejectors, and every description of first-class Brass Work for Engines and Boilers. Gas-Works Managers who have not our large book should send for it.

16th edition, 1000 engravings, 4to., post free 2s. in stamps, weight 10 oz., cost of production £1000,

BAILEY'S Illustrated Inventions, containing details and prices of goods in our five several departments:—(1) Brass Foundry, Steam Gauges, Indicators, Feeders, and Fittings; (2) Engineers Sundries, Small Tools, and Stores; (3) Machine Pump and Fire Engine; (4) Turret Clock, &c.; (5) Electric Telegraph, A B Instruments, Bells, and Apparatus.

J. BAILEY and Co., Albion Works, Salford, LANCASHIRE.

TO GAS COMPANIES.

PATENT FUEL AND LIME CEMENT FROM GAS LIME.

This invention (protected by three patents) consists in a new method of turning the foul lime of Gas-Works to profit. The process is very simple and inexpensive, and can be worked by Gas Companies at a very small outlay.

By simply mixing the foul lime with tar it is converted in the first instance into an excellent fuel. By burning this fuel a very valuable material for building purposes is obtained, which can be used either as lime or cement or plastic. When used as cement it will be found equal to the best Portland in durability and hardness.

Licences to work the invention will be granted by the Patentee to Gas Companies on very reasonable terms.

For further particulars apply to Mr. E. MADDOCKS, Manager of the Gas-Works, KETTERING.

OXIDE OF IRON.—We are prepared to supply, on moderate terms,

HYDRATED PEROXIDE OF IRON (BOG OCHRE),

Same quality as supplied by us to several of the most extensive Gas Companies, and which has given entire satisfaction.

FRANCIS RITCHIE & SONS,
BELFAST.

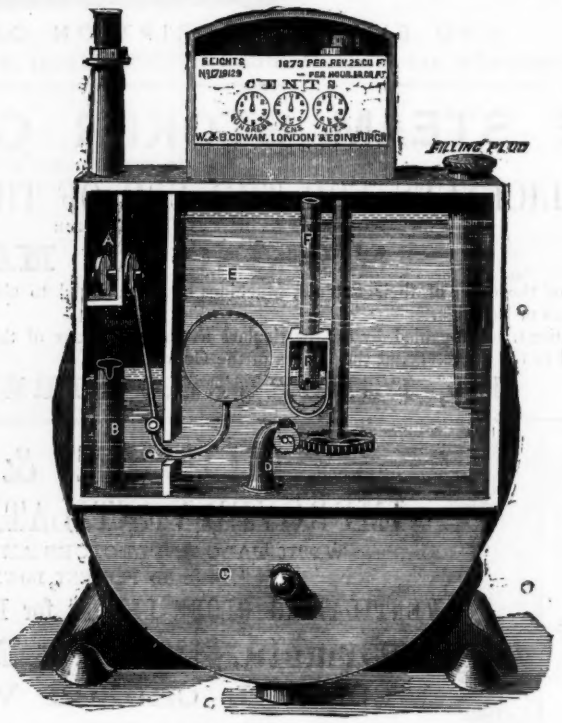
INTERNATIONAL EXHIBITION, 1862.
CLASS X.
PRIZE MEDAL
For excellence of Fire-Clay Gas Retorts, and
"HONOURABLE MENTION" for
good quality of Fire-Bricks.

WILLIAM STEPHENSON & SONS,
THROCKLEY,
NEWCASTLE-ON-TYNE.

ESSON'S

PATENT COMPENSATING GAS-METER,

IN TIN CASE, PATENT SIDE VALVE ARRANGEMENT.



DESCRIPTION.

The gas passes from the valve-box A by the overflow-pipe B into the waste water box C, and upwards through the spout D to the measuring drum; E is the compensating fountain, in which also is the float, the lever of which, passing through the hole G, opens and shuts the valve.

When the water level in the meter lowers, the *bottom end* of the air or gas tube F becomes unsealed, thereby admitting air or gas into the upper part of the fountain, which, causing water to pass through the hole G, restores the level in the meter, when this action ceases.

The float and valve are beyond the influence of either inlet or outlet pressure, and the fountain is large enough for a year's supply.

SOLE MANUFACTURERS,

W. & B. COWAN,

WET AND DRY GAS-METER MANUFACTURERS,

(ESTABLISHED 1827,)

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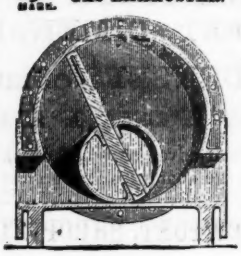
BALLS POND ROAD,
LONDON, N.

BUCCLEUCH ST. WORKS,
EDINBURGH.

J. BEALE'S
PATENT
GAS EXHAUSTER.



BEALE'S CONTINUOUSLY ACTING

GAS EXHAUSTERS

ARE NOW MANUFACTURED BY

B. DONKIN & CO.

MR. J. BEALE, of East Greenwich, having retired from business, has made an arrangement with B. DONKIN & CO. for the sole manufacture of his Patent Solid-Slide Gas Exhausters.

B. D. & Co. also make Steam-Engines to drive Gas Exhausters direct or otherwise, and Gas-Valves.

Estimates and Prices on application to

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ENGINEERS & IRONFOUNDERS,
BERMONDSEY, LONDON, S.E.

J. & J. BRADDOCK,

GAS ENGINEERS,

GLOBE METER-WORKS, OLDHAM,

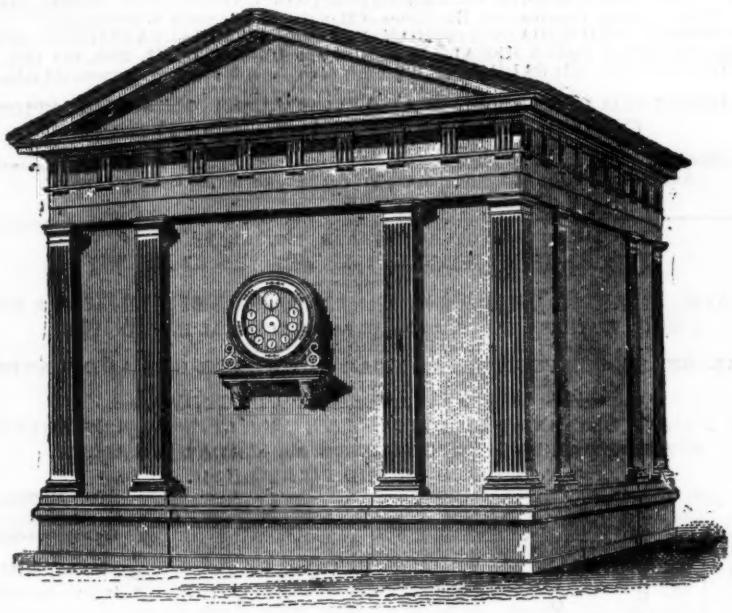
MANUFACTURERS OF

WET & DRY CONSUMERS GAS-METERS

OF THE HIGHEST EXCELLENCE;

ROUND STATION-METERS,

ON CAST-IRON STANDS.



SQUARE STATION-METERS,

WITH PLANED JOINTS.

GOVERNORS, GAUGES, INDICATORS, MAIN COCKS, &c.

GAS COOKING APPARATUS.

WATER-METERS SUITABLE FOR ALL PRESSURES.

Home and Foreign Orders promptly attended to.

All Sizes of CONSUMERS METERS, STATION-METERS, and GOVERNORS generally in Stock.

Orders almost invariably despatched on the day of receipt.

TERMS, &c., ON APPLICATION.

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GAS ENGINEERS,

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EDINBURGH, AND

2, KING EDWARD STREET,

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STATION-METERS, GOVERNORS, CONSUMERS METERS, GAS LUSTRES, CHANDELIERS, BRACKETS, &c.,

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Mr. ANDERSON advises Companies on all matters connected with the manufacture of Gas and the construction of Works.

PATENTEE and MANUFACTURER of the following Inventions:—

RETORT SETTINGS, heated by tar without the production of smoke.

STEAM-ENGINES and EXHAUSTERS, separately or combined.

FOUR-WAY VALVES, one of which is equal to three ordinary Valves.

STATION GOVERNORS—the Gasholder cannot tilt and cause accident.

BREEZE AND TAR FUEL MACHINE.

A Pamphlet containing Eighteen Illustrations of the foregoing, with letterpress on the construction of Works, post free, 2s. 6d.

N.B.—The second edition of this Work, *now ready*, co illustrations of the Machine for converting Breeze and Tar into Fuel for heating the Retorts.

"The Author is well qualified to speak authoritatively upon the important subjects to which his pamphlet refers."—*Artizan.*

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Manufactory for every description of Casting and Machinery for Gas-Works and Water-Works.

Warehouse in London for Cast-Iron Pipes and Connexions of all sizes and in any quantity, Scott's Wharf, Bankside, Southwark.

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BEST GLASS-HOUSE POT AND CRUCIBLE CLAY;

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Orders of any magnitude, for home and expertation, executed with all possible despatch.

N.B.—A quantity of Retorts in stock. Circulars, 15 in. and 16 in. Ovals, 20 in. by 14 in. D's, 15 in. by 13 in.; 16 in. by 12 in.; 18 in. by 14 in. 20 in. by 16 in.; 21 in. by 14 in.; and 24 in. by

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NEAR NEWCASTLE-UPON-TYNE,

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MANUFACTURERS OF

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SCOTSWOOD FIRE-BRICK WORKS,

NEAR

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FOR

GAS PURIFIERS & SCRUBBERS.

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These Sieves are made with parallel or bevel bar, and guaranteed to be well seasoned yellow deal, and not common spruce so generally used.

N.B.—Specimens sent free on application.

FIRE BALLS! FIRE BALLS!! FIRE BALLS!!!

THE BEST ECONOMIZERS OF FUEL.

Apply to the Manufacturer,

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PIPES, VALVES, IRON ROOFS,

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DESIGNS, SPECIFICATIONS, & ESTIMATES FURNISHED.

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Requiring New Street-Lamps are recommended

KEEN'S PATENT DOUBLE-CLIP STREET-LAMP.

A great improvement on the old-fashioned 14-in. Lamps.

They have been sold to various Gas-Works throughout the country and abroad, and the highest satisfactory testimonials are given as to their superiority.

For particulars of price, &c., apply to

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CLAYTON'S PATENT SIX-WAY VALVE only requires one valve to work two purifiers; saves more than three-fourths of the connexion-pipes; requires neither tees, elbows, nor bends; no racks or springs to get out of order.
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AND
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Beg to inform Gas and Water Companies and the public, that they keep in stock in London all the CASTINGS in general use in Gas and Water Works, including Iron Retorts, Socket and Flange Pipes, Bends, Branches, and Syphons of all sizes, Lamp Columns, &c., &c.
N.B.—Orders for Cast-Iron Tanks, Girders, Columns, Cylinders, and all irregular castings, will have immediate attention. CHARLES HORSLEY, Agent.

HOPKINS, GILKES, & CO.,
LIMITED,
MIDDLESBOROUGH,
SUPPLY GAS & WATER PIPES of EVERY SIZE.
Plain, Turned and Bored, and Coated.
CAST-IRON RETORTS.
Castings for Gas-Works of every description.
EXHAUSTERS.
LONDON OFFICE: 25, LAURENCE POUNTNEY LANE.

GAS AND WATER PIPES.

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METAL MERCHANTS AND CONTRACTORS,
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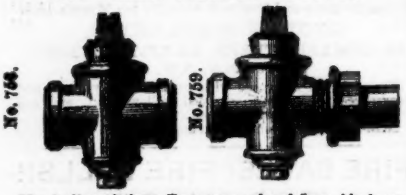
CAST-IRON GAS AND WATER PIPES AND FURNISHINGS.
MALLEABLE IRON TUBE FOR GAS, WATER, AND STEAM.
AGENTS FOR THOMAS GLOVER & CO.'S
PATENT DRY GAS-METERS.
DELIVERY F.O.B. ON CLYDE.
Lists on application.

LAMBERT'S
CAST-IRON GAS-MAIN COCKS,
WITH PATENT WHITE METAL PLUGS.



The bodies of these Taps are made of Iron, black or galvanized, and the Plugs of Patent Metal. They are warranted not to set fast or corrode as do iron or brass Cocks, will always work easily, are strong, well made, durable, of little or no intrinsic value, and, therefore, not likely to be stolen; and the PRICES are (especially upon the larger sizes) FULLY 50 PER CENT. LESS THAN BRASS COCKS.
GAS-JOINTS, CHANDELIERS, PENDANTS, BRACKETS, ETC.;
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Is now in use in Moorgate Street, Cheapside, and Trafalgar Square, and has been in successful operation upon Waterloo Bridge since Oct. 7, 1871.
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FIRE CLAY & BRICK WORKS,
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Manufacturers of GAS-RETORTS, GLASS-HOUSE FURNACE & BLAST-FURNACE BRICKS, LUMPS, TILES, and every description of FIRE-BRICK.
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ALSO THE FIRST PRIZE MEDALS AT LEEDS AND LYONS IN 1858, 1868, and 1872.
"REDUCTION IN PRICES OF PEET'S VALVES, consequent upon largely increased sales."
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Samples of Specialties may be inspected at Stand No. 542, Group XIII., in the English Machinery Annexe of the Vienna Exhibition, 1873. For List of same see German Official and "British Section" Catalogues.

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MANUFACTURERS OF
CRYSTAL, BRONZED, & ORMOLU CHANDELIERS, IMPROVED CRYSTAL STAR & SUN LIGHTS, VESTIBULE LAMPS, AND THE PATENT CRYSTAL ILLUMINATION.
A LARGE STOCK ALWAYS IN HAND OF
IRON, BRASS, COMPOSITE, AND LEAD TUBES, FOR GAS AND WATER,
AND EVERY DESCRIPTION OF
GAS AND WATER FITTINGS.
THE PATENT DRY AND WET METER, WITH THE LATEST IMPROVEMENTS.
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GAS MOONS,
Cut and Engraved, of the newest designs;
GAS REFLECTORS
In Silver and Glass;
GAS NIBS
AND
BURNERS
Of every description.

Pattern-Books of Gas-Fittings, Crystal and Ormolu Chandeliers for 1873, are now complete.

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ESTABLISHED 1830.

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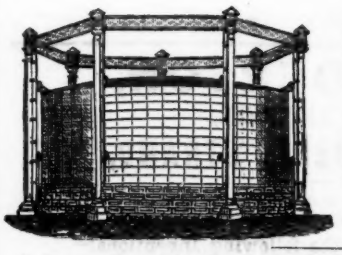
CONTRACTING GAS ENGINEERS,
GASHOLDER & GENERAL GAS APPARATUS MAKERS,
MANUFACTURERS OF
BOILERS, IRON ROOFING, IRON BRIDGES,
AND GENERAL IRONWORK.



S. C. AND SONS undertake Contracts of any magnitude for the Erection of new and Remodelling of existing Gas-Works, for Gasholders, Cast and Wrought Iron Tanks, Iron Roofs, and every description of Apparatus for the Manufacture and Distribution of Gas.
Special attention is invited to their "Improved Condenser," which is very effective, and much approved; also to their patterns of Annular and other Condensers, Scrubbers, and Purifiers, of all sizes, which they arrange either with Centre or Ordinary Slide Valves.
WORKS FOR THE SUPPLY OF
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SOLE MAKERS OF BRETT'S PATENT COKE BARROW.
Experienced Retort Setters sent to any part of the Kingdom.
Address: PROVIDENCE IRON-WORKS, MILLWALL, LONDON.

THE
HUCKNALL COLLIERY COMPANY
Can offer a CANNEL COAL yielding a large quantity of Gas of superior quality.

Prices and information on application to the HUCKNALL COLLIERY COMPANY, Hucknall Torkard Collieries, near NOTTINGHAM.

POPE & PEARSON'S GAS COAL.—We have now the authority of several of the most eminent Gas Engineers of London in stating that our Coal yields *in practical working over* 10,000 *cubic feet of gas, with an illuminating power of* 16 *candles;* or by the standard burners now used by the London Gas Companies, an illuminating power equal to 17½ candles.

One ton yields 12½ cwt. of good coke. This Coal can be shipped from Hull, Goole, Liverpool, Morecambe, and Barrow.

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From the Mines of the
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Messrs. W. H. BRANCKER & Co.

CANNEL COAL.
COPPA COLLIERY, MOLD,
Beg leave to call the attention of Gas Companies to the superior quality of their
CANNEL FOR GAS-MAKING PURPOSES.
This Cannel produces in actual working, in iron retorts, 9200 cubic feet of 32-candle gas, and upwards of 11 cwt. of coke, and in clay retorts will produce 11,500 cubic feet of 25·9-candle gas.
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Waggons supplied for delivery by railway to any part of England or Wales.
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